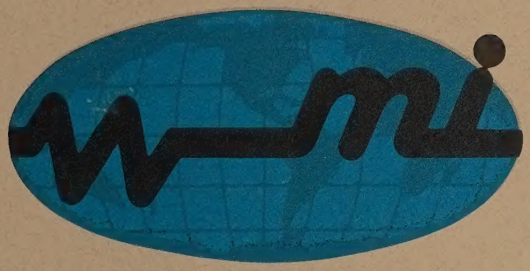
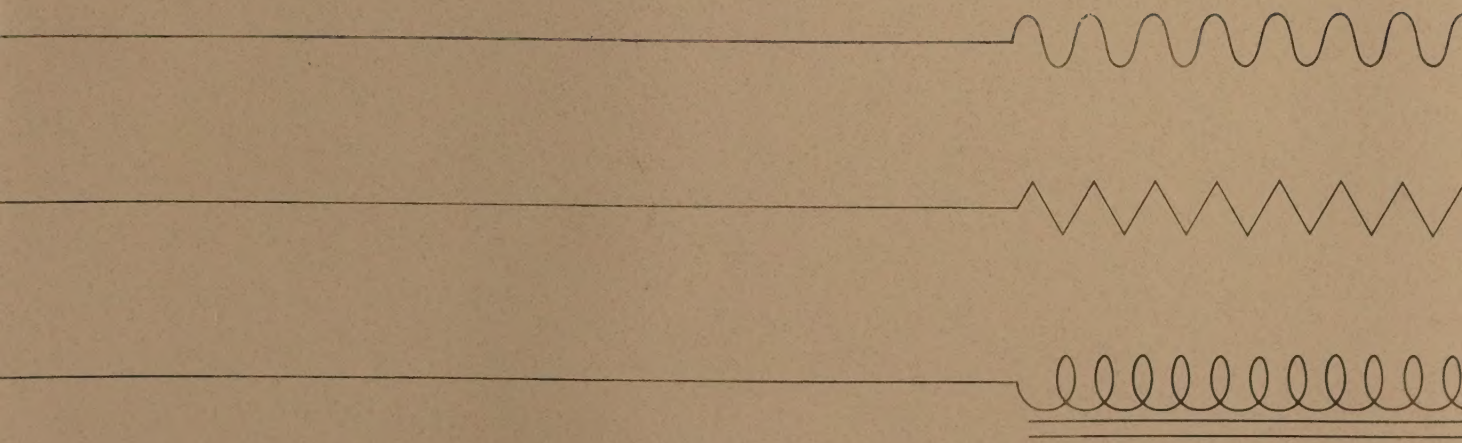


Measurements International



SYSTEM MANUAL

MODEL 4210A/4220A

FOUR TERMINAL MATRIX SCANNER

INTRODUCTION

SCOPE

This manual contains operating information on the Model 4220A GPIB-Controllable Matrix Scanner.

GENERAL DESCRIPTION

The Model 4220A Automated Matrix Scanner was engineered to provide an easy means of measuring groups of resistors without the need to continually change leads. It can also be used to scan various voltages references in back to back or nominal value measurements. The Matrix Scanner can be operated via front panel control or the GPIB interface bus.

Special care has been taken to minimize thermal emfs and improved insulation resistance characteristics. The switching mechanisms used are low-thermal two-coil latching-relays requiring a pulse of only a few milliseconds to energize or de-energize the relay. Several protection circuits are used to ensure that only one set of relays (C and P) is selected at any one time.

TABLE OF CONTENTS

INTRODUCTION 2

SCOPE 2

GENERAL DESCRIPTION 2

OPERATION 1
- POWER 1
- CHANNEL SELECT 1
- A OR B BUTTONS 1
- A.B LOCKOUT 1
- A AND B CHANNEL INDICATORS 2

REMOTE OPERATION 2
- INTERFACE CONNECTIONS 2
- ADDRESS SWITCH 2
- A.B LOCKOUT 2
- REMOTE PROGRAMMING 2
- COMMAND SET (VIA GPIB) 2
- CLEARING ALL CHANNELS 3
- REMOTE 3

INSPECTION 4
- PHYSICAL 4
- ELECTRICAL 4
  - LINE VOLTAGE 4
  - INPUT VOLTAGE SELECTOR 4
  - FUSE INSPECTION/REPLACEMENT . . . 5
  - FUSE REQUIREMENTS 5

INSTALLATION 6
- ENVIRONMENTAL REQUIREMENTS 6
- CONNECTIONS 6
  - REAR PANEL 6
  - INPUT CONNECTIONS 7
  - A AND B OUTPUT TO 6010A OR 6000A 7

SERVICE INFORMATION 8
- DISASSEMBLY 8
- REMOVING THE TOP PANEL 9
- REMOVING THE FRONT PANEL 9
- REMOVING THE BACK PANEL 10

SPECIFICATIONS 12
- GENERAL 12
  - Number of Inputs 12
  - Control 12
  - Bus Input 12
  - Rear Panel Connections 12
  - Switch Outputs 12

Size 12
Warranty 12
ELECTRICAL 12
Insulation Resistance 12
Thermoelectric Potentials . . . 12
Power 13
RELAY CONTACT RATINGS 13
Max. Switching Power 13
Max. Switching Voltage 13
Max. Carrying Current 13
Max. Switching Current 13
Contact Resistance 13
Expected Life 13

RECOMMEND SPARE PARTS LIST

SYSTEM PARTS LIST

DRAWINGS

POWER SUPPLY LAYOUT. 00101
POWER SUPPLY SCHEMATIC 40011

KEYBOARD LAYOUT. 4220102
KEYBOARD SCHEMATIC 41001

SCANNER RELAY LAYOUT 4100202
SCANNER RELAY SCHEMATIC. . . . 41002

MICROPROCESSOR LAYOUT. . . . 4100301
MICROPROCESSOR SCHEMATIC . . . 41003

4220A I/O EXPANDER LAYOUT. . 4220301
4220A I/O EXPANDER SCHEMATIC 42203

CHANNEL INDICATOR LAYOUT . . 8000104
CHANNEL INDICATOR SCHEMATIC. . 80001

OPERATION

POWER

This button applies AC Power to the Model 4210A (4220A). On power up all input channels are automatically cleared, i.e., all LEDS are out.

CHANNEL SELECT

In front panel operation numbered inputs designated "C1, C2, P1, P2" 1 through 20 are connected to either the "A" or "B" "C1, C2, P1, P2" terminals by pressing any one of the front panel buttons designated 0 through 9 or combination up to 20. However, the relays will not be activated until either the "A" button or the "B" buttons are depressed.

A OR B BUTTONS

Pressing either of these buttons after a desired channel number (numerical buttons) have been selected will automatically clear the previously set channels and then set the newly selected channel and also turn on the appropriate light. Pressing the A or B buttons before selecting a desired channel via numerical buttons is an invalid entry and is ignored.

A.B LOCKOUT (Rear Panel)

NOTE:
Should the same channel be selected for both sides then an error is indicated by the flashing "Remote" led. The error condition can be cleared by depressing the "Remote" button which will clear the flashing indication.

Should a condition exist where it was necessary to select the same channel on both sides then position 8 of the Address Switch located on the rear panel can be turned off. However it is necessary to reboot the instrument by turning the Power of the instrument off and on again.

A AND B CHANNEL INDICATORS

Front panel LEDS are used to indicate the channel selected. The led indicators are driven by a fourth contact on the relay to insure that the relay is operational and that the input has been connected to the output terminals.

REMOTE OPERATION

INTERFACE CONNECTIONS

The Model 4210A (4220A) is compatible with the IEEE-488-1978 standard. Interface connection is made via the 24-pin connector located on the rear panel.

ADDRESS SWITCH

The address of the Model 4210A (4220A) is determined by the setting of the address select switch located on the rear of the instrument. The switches, designated 1, 2, 4, 8 and 16 are read at power-on or whenever a GPIB "CLEAR" message is received over the bus. The Model 4210A (4220A) leaves the factory with the address switch set to decimal code "3".

A.B LOCKOUT

Position #8 on the Address switch has been reserved to protect the same channel from being selected on both sides and is normally used for test purposes only. When selecting "1A" and then "1B" an error is indicated by the REMOTE led flashing. The error is cleared by pressing the REMOTE led and re-selecting the proper channel.

REMOTE PROGRAMMING

There are two functions of the 4210A (4220A) which are remotely programmable - clearing all channels and selecting a specific channel.

COMMAND SET (VIA GPIB)

To select a specific channel send a character string consisting of the channel number from 1

to 20 and A or B. To select channel 1 on the A side send a "1A", to select channel 14 on the B side send a "14B", etc. The character string must be terminated by a non numeric character such as a carriage return (ASCII "13") or space (ASCII"32"), many controllers automatically append a carriage return, line feed to strings when they are sent. If your controller does not, send the channel string followed by a space, eg "16 32 ".

CLEARING ALL CHANNELS

To clear all channels send the character "*" via the bus.

REMOTE

Any character received via the bus (even if invalid) sets the "Remote" LED on. Remote remains on until the **REMOTE** key is pressed or a GPIB CLEAR is sent over the bus. While Remote is on the front panel input select keys are ignored.

NOTE:
The REMOTE led will flash the same channel on both A Channel and B Channel when addressed. Pressing the REMOTE button will clear this condition and leave the unit in the remote mode.

INSPECTION

PHYSICAL

The Model 4220A is thoroughly inspected and tested before shipment. However, damage could result from shipping. Do a visual check of the equipment and packaging materials, both should be free of mars or dents. The shipping case should be kept until the instrument can be thoroughly checked for mechanical and electrical damage.

ELECTRICAL

LINE VOLTAGE

The Model 4220A is tested and shipped with the AC voltage selected for the destination country. However, the system should be checked to insure that the setting is correct. AC voltage settings are on the back of the system in the power entry module (figure 1). Instructions for setting the voltage are in the **INPUT VOLTAGE SELECTOR** section of this manual.

INPUT VOLTAGE SELECTOR

Remove the power cord before attempting to change the AC input selection. Locate the small square notch in the tab at the top of the power entry module. Use a small screw driver to gently pry the fuse cover off. The power is selected by turning the selection switch. This can be done with your fingers or by inserting a screw driver into the slot between the 120 Vac and 220Vac indicators.

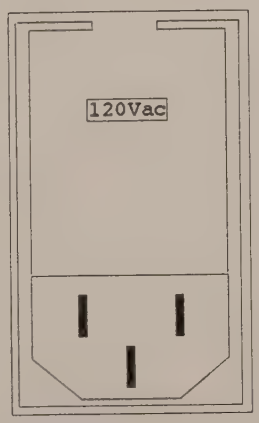


Figure 1... Power entry

WARNING:

If the voltage selection was incorrect the **FUSE** should be checked for correct rating. Refer to the **FUSE REPLACEMENT** section (below) for replacement instructions and specifications.

FUSE INSPECTION/REPLACEMENT

The fuse is located inside the power entry module located on 4220A rear panel. Refer to figure 1 and the **INPUT VOLTAGE SELECTOR** section for instructions on how to remove the cover.

WARNING:

Remove the power cord from the 4220A before attempting to change the fuse.

FUSE REQUIREMENTS

AC LINE VOLTAGE	SLOE BLOW FUSE
100	2 AMP. 250 VOLT
120	2 AMP. 250 VOLT
220	1 AMP. 250 VOLT
240	1 AMP. 250 VOLT

INSTALLATION

The model 4210A (4220A) is supplied in a standard 19" case allowing the unit to be either bench mounted or rack mounted. It comes supplied with an approved six-foot three-conductor AC power cable.

ENVIRONMENTAL REQUIREMENTS

In order to meet and maintain the specifications listed in Section 1 the unit should be operated in a stable environment of 23°C ± 3°C at 50% ± 10% relative humidity.

CONNECTIONS

REAR PANEL (Fig 2)

Resistor connections to your Model 4210A (4220A) are made at the rear of the instrument. These connections consist of 40 (80) low-thermal binding posts designated C1 and C2 for current inputs and P1 and P2 for potential inputs in columns designated "1" through "10" ("20"). 5 (4220A), 4 (4210A) shield terminals are provided for connecting the shields of the input cables. A rear panel cover is also provided for shielding the input connections from thermals.

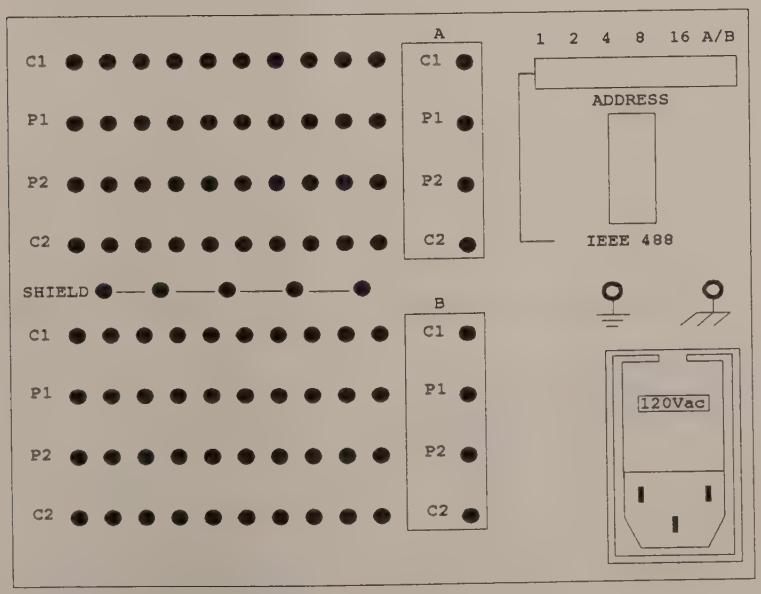


Figure 2... Back panel

NOTE:
The shield terminals are floating and can be tied down to ground or driven at users discretion.

INPUT CONNECTIONS (FIG 3)

The resistors under test are connected to the C1, P1, P2 and C2 terminals on the back of the system.

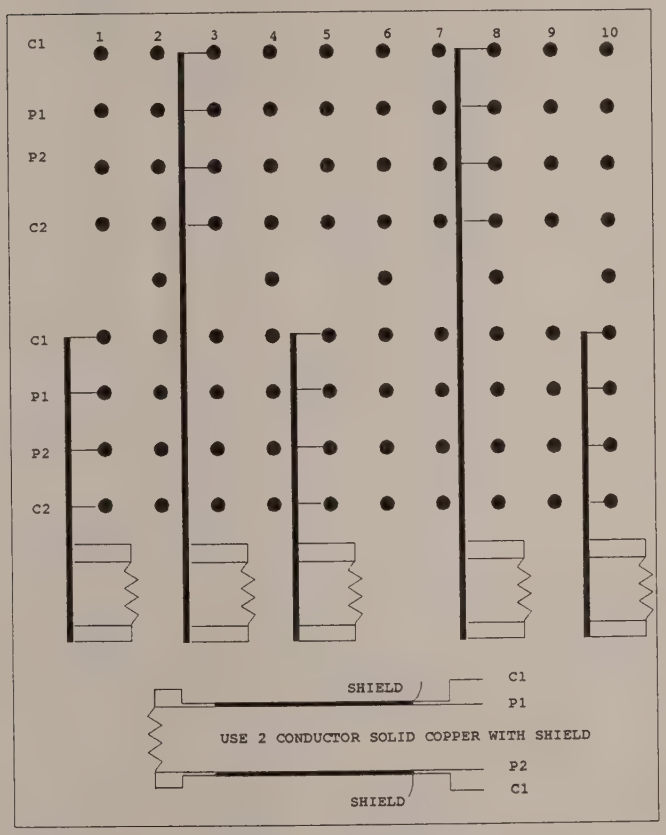


Figure 3... Input connections

A AND B OUTPUT TO 6010A OR 6000A (Fig 4)

Connections to the measuring apparatus are also made via the rear panel terminals designated "A" "C1" and "C2" (current) and "P1" and "P2" (potential) and "B" "C1" and "C2" for current and "P1" and "P2" for potential. Shield terminals are provided which allows the shields of the cables to be driven.

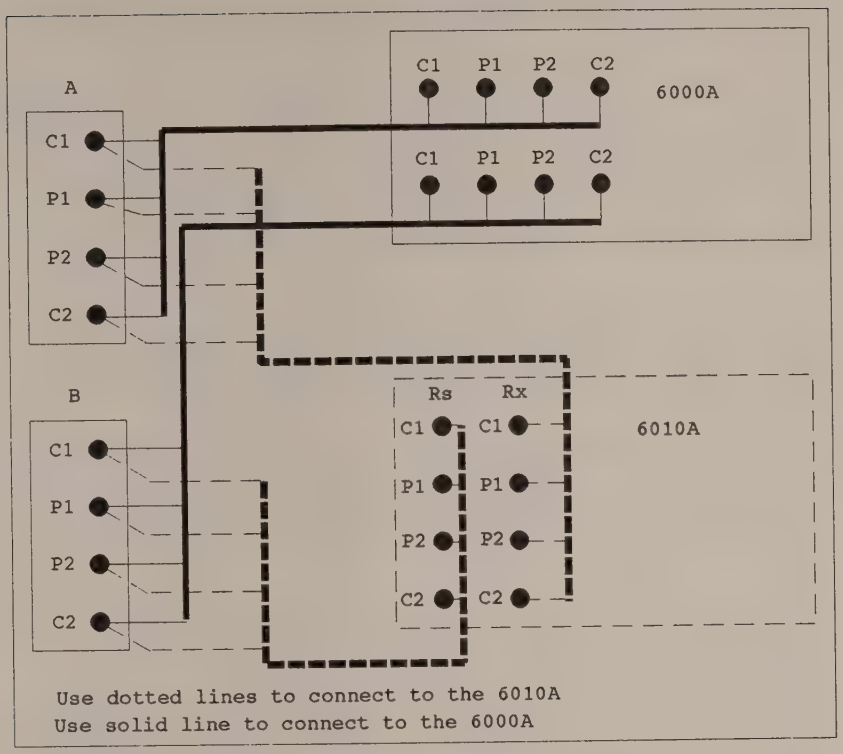


Figure 4... Output connections

SERVICE INFORMATION

The Model 4220A was engineered to provide an easy means of disassembly for alignment and trouble shooting. The case of the 4220A is made up from two modular 5½ inch enclosures with a 10 inch front and back panel.

The 4220A has only three circuit boards and no adjustments. Service would only be required if there was a system failure which could be repaired quickly using normal trouble shooting techniques and standard test equipment.

DISASSEMBLY

TO AVOID ELECTRIC SHOCK, REMOVE THE POWER CORD AND INPUT SUPPLY LEADS BEFORE DISASSEMBLING THE INSTRUMENT.

The top panel is removed to gain access to the printed circuit boards and power supply. The front panel of the instrument is removed to gain access to the keyboard and indicator

board. Removing the back panel allows access the scanner relay circuit.

REMOVING THE TOP PANEL see figure 5

1) Remove the two screws (# 1 and # 2 figure 5) holding the top panel to the rear panel.

2) Slide the top panel to the back of the system.

Looking from the back of the system the power supply is mounted on the right hand side. The power transformer can be seen under the PCB.

The left hand side of the system has two PCB's mounted one on top of the other. The top PCB is the I/O Expander Control and the bottom one is the Micro Controller board.

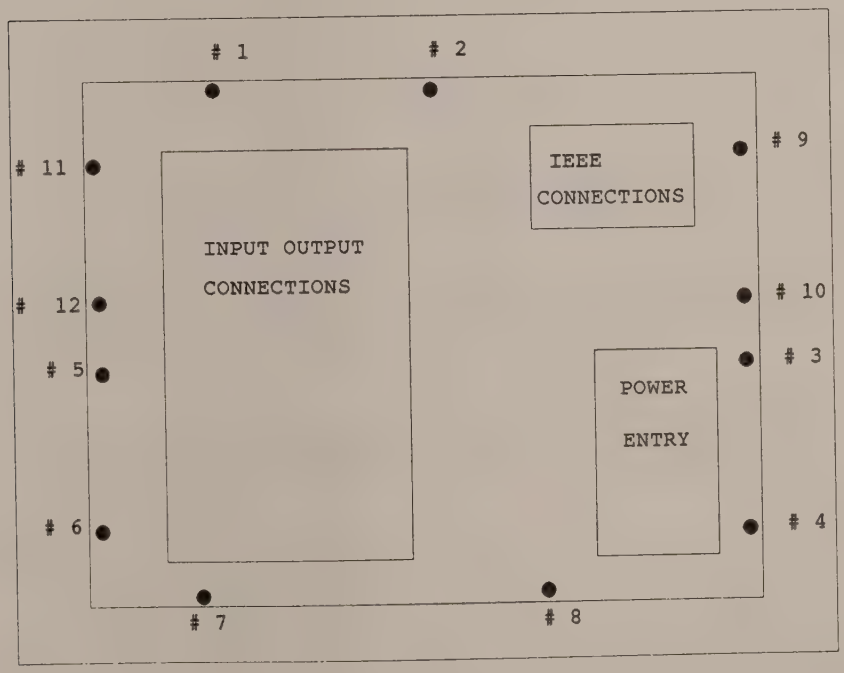


Figure 5... Back panel

REMOVING THE FRONT PANEL see figure 6

1) The front panel contains the display and keyboard printed circuit boards.

2) Remove the four #10 screws (blue) located in the front corners of the left and right side panels (see figure 6 # 1 and # 2).

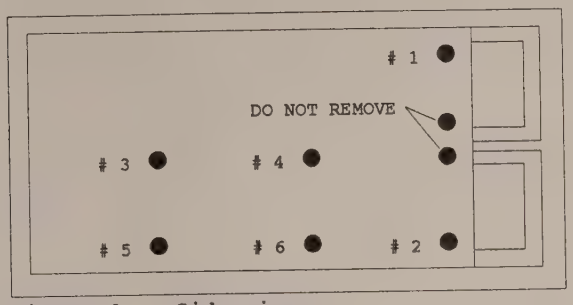


Figure 6... Side view

3) The front panel can then be pulled away from the chassis.

NOTE: The top and bottom bezel (blue) are connected to the front panel.

4) Pull the top of the front panel from the chassis and then the bottom.

NOTE: Do not pull to hard as the front panel Channel Indicator and Keyboard are connected to the micro printed circuit board via ribbon cables.

5) To completely remove the front panel disconnect the ribbon cable from the Keyboard and Indicator board.

REMOVING THE BACK PANEL see figure 5

1) The back panel contains the external connections.

2) Remove the all the screws from the back panel (see figure a # 1 to # 12) the front corners of the left and right side panels.

3) Remove the top panel.

4) Remove the bottom panel.

5) The back panel can then be pulled away from the chassis.

NOTE: Do not pull to hard as the back panel is connected to the internal circuit boards.

6) To completely remove the back panel very carefully remove all connections.

SPECIFICATIONS

GENERAL

Number of Inputs:

Model 4210A 10

Model 4220A 20

Control:

Front panel switches or IEEE-488 bus.

Bus Input:

24 pin IEEE-488 connector.

Rear Panel Connections:

Low thermal tellurium copper binding posts.

Switch Outputs:

Four low thermal tellurium copper binding posts.

Size in Inches (Millimetres):

Model 4210A 17.7" (451) wide, 12.0" (306) deep, 5.25" (133) high

Model 4220A 17.7" (451) wide, 12.0" (306) deep, 10" (255) high

Warranty: 1 year

ELECTRICAL

Insulation Resistance:

$> 10^{11}$ ohms

Typically 10^{12} ohms

Thermoelectric Potentials:

100 nanovolts max. 50/60 Hz
Typically 10-30 nanovolts.

Power:

115/230 V +/- 10%

RELAY CONTACT RATINGS

Max. Switching Power:

60W,125VA

Max. Switching Voltage:

220 V DC, 250 V AC

Max. Carrying Current:

4 A AC, DC

Max. Switching Current:

2 A AC, DC

Contact Resistance:

<0.05 ohms

Expected Life:

Mechanical 10^{8}

Electrical 2A 30 VDC 5×10^{8}

RECOMMEND SPARE PARTS

ITEM	QTY	MANUFACTURE	DESCRIPTION	MIL PART #
1	2	C&K	SWITCH WITH LED	MP01R193CBE
2	1	C&K	SWITCH NO LED	MP01R09CBE
3	2	LITE-ON	BRIGHT RED LED	LTL-4211
4	2	BUSS	FUSE	AGC-1
5	2	AROMAT	RELAY 4A LATCHING 12V	S43B-L2-12V
6	2	AROMAT	RELAY 4A LATCHING 5V	S4EB-L2-5V
7	2	TAG	CAP 10uF 35V TANTALUM	TAG 10/35
8	2	MIL	BLACK TERMINAL HEAD	4100204

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: 20 Channel Matrix Scanner Top Assy Date Printed 01-Oct-93

Revision 2 Number: 422 Date Created 28-Aug-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	Tracewell	2-R517-12	Enclosure	19", Lt. Blue w/ Lt. Grey Panel		
2	2	1	MIL		Front Panel Assy		42201	
3	3	1	MIL		Rear Panel Assy		42202	
4	4	1	MIL		IO Expander Assy		42203	
5	5	1	MIL		Power Supply Assy		40011	
6	6	1	MIL		Microprocessor Assy		42205	
7	7	1	Belden	17500	Line Cord			
8	8	1	MIL		Micro-Kbd Cable Assy		41004	
9	9	1	MIL		Power Harness Assy		42204	
10	10	1	MIL		Terminal Cover			
11	11	12	MIL		Relay Shield		42008	
12	12	2	Spae-Naur	B-1783	Rivet	0.125*0.250, Tubular		
13	13	4	Spae-Naur	SS-181	Screw	3/8"(10-32), Set Screw		
14	14	2	Panduit	CT156F22-4	Connector	4 pin, #22, IDC		
15								

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Front Panel Assy Date Printed 01-Oct-93

Revision 2 Number: 42201 Date Created 20-Oct-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		Panel	Modified Front Panel	4220101	
2	2	1	MIL		Plate	Keyboard Mounting Plate	8000102	
3	3	1	MIL		PCB	Keyboard CCT Assy	4220102	
4	4	2	MIL		PCB	Channel Indicator Assy	8000104	
5	5	1	Schadow	ZF35EEN1101011	Switch	DPST, 5 Amp, 240V, Indicator, Power		
6	6	13	OCE		Spacer	#4*3/16-1/4 O.D., Round Nylon		
7								
8								

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Keyboard CCT Assy
Revision 4 Number: 4220102
Date Printed 01-Oct-93
Date Created 20-Oct-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		PCB	Keyboard PCB	410010201	REV-2
2								
3	2	1	Nat Semi	74C923	IC	Switch Decoder		U1
4	3	1	Any	74HCTLS09	IC	Quad Nor		U2
5								
6	4	1	Philips	MRS25F-200	Resistor	200R, 1/4W, 1%, MF		R1
7								
8	6	2	Centralab	CZ20C104M	Capacitor	0.1uF, 50V, Ceramic, .2"S		C2,3
9	7	1	Philips	368-25104	Capacitor	0.1uF, 100V, Film .4"S		C6
10	8	1	Philips	368-25105	Capacitor	1.0uF, 100V, Film, .6"S		C1
11								
12	9	1	C&K	MP01R193CBE	Switch	Pushbutton, Grey, Red LED		S1
13	10	12	C&K	MP01R09CBE	Switch	Pushbutton, Grey		S2-13
14								
16								
17	12	1	Amp	102159-3	Connector	16 pin, PCB Header, R/A		P1
19								
20								
21								

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Channel Indicator Assy Date Printed 01-Oct-93

Revision 2 Number: 8000104 Date Created 07-Sep-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		PCB		800010401	REV-0
2	2	20	Lite-On	LTL-4211	LED	LED, T-1, Bright Red		D1-10,13-22
3	3	4	TI	7407	IC	Hex Inverter		U1-4
4	4	4	Bourns	4608X-101-472	Resistor	4.7K, 8 Pin SIP, bussed		RP1-4
5	5	1	Panduit	MLAS100-4	Connector	4 Pin, PCB Header, R/A		P1
6	6	2	Panduit	MFSS100-10	Connector	10 Pin, PCB Header		P2,3
7	7	1	Phillips	MRS25F-200	Resistor	200R, 1/4W, 1%, MF		R1
8	8	1	ITT	TAPC10M35	Capacitor	10uF, 35V, Tantalum, .2"s		C1
9	9	4	Sprague	1C20Z5U104...	Capacitor	0.1uF, 50V, Ceramic, .2"s		C2-5
10	10	20	OCE		Spacer	#4*1/4-3/16 O.D., Round Nylon		

Note: Led D1-10, 13-22 mount on back of board

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Rear Panel Assy — Date Printed 01-Oct-93

Revision 3 — Number: 42202 — Date Created 13-Jun-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		Panel	Modified Rear Panel	4220201	
2								
3	2	4	MIL		Relay Cct Assy		4100202	
4								
5	3	1	Aerovox	A02PM5LD01	Socket	Power Entry Module, Filter, Fuse		
6	4	1	Buss	AGC-3/4	Fuse	.75A		
7	5	1	MIL		GPIB Switch Assy		20002	
8	6	1	MIL		GPIB Socket Assy		20010	
9								
10	7	93	MIL		Terminal	Low Thermal, Screw	4100203	
11	8	1	POMONA	3750-5	TERMINAL	BINDING POST,GOLD PLTD,GREEN		
12	9	1	HH SMITH	137	TERMINAL	BINDING POST,METAL		
13	10	4	KEYSTONE	8425	SPACER	HEX MALE/FEMALE 6-32 THREADED		
14	11	4	KEYSTONE	1708	SCREW	THUMB 6-32		
15	12	186	HH Smith	2665	Washer	#8, Nylon, Shoulder		
16	13	93	MIL		Terminal Head		4100204	
17	14	372	MIL		Spacer	Low Thermal	4100205	

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Relay Cct Assy
Revision 5 Number: 4100202-12V

Date Printed 01-Oct-93
Date Created 20-Oct-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		PCB	Relay PCB	410020201	Rev. 2
2								
3	2	20	Aromat	S4EB-L2-12V	Relay	4A, Latching, 12V		K3-12 K15-24
4								
5	3	40	Motorola	1N4004	Diode	1A, 400V		D3-12,15-24 27-36,39-48
6								
7	4	1	ITT	TAG 10/35	Capacitor	10uF, 35V Tantalum, .2"S		C1
8	5	1	ITT	TAG 150/16	Capacitor	150uF, 16V Tantalum, .2"S		C2
9								
10	6	1	Panduit	MFSS100-4	Connector	4 pin, PCB Header		P1
11	7	3	Panduit	CT100F26-10	Connector	10 pin, #26, IDC		
12	8	3	Panduit	TC100F-10	Cover	10 pin, for CT100F26-10		
13								
14	9	1	Phillips	MRS25F 1K	Resistor	1K, 1/4W, 1%, MF		R1
15	10	1	Phillips	MRS25F 560R0	Resistor	560R0, 1/4W, 1%, MF		R2
16								
17	11	A/R	Belden	83002-1	Wire	#26, Str., Teflon Insul, Brn		
18	12	A/R	Belden	83002-7	Wire	#26, Str., Teflon Insul, Vio		
19	13	A/R	Belden	83002-8	Wire	#26, Str., Teflon Insul, Grey		
20								
21	14	30			Link	Latching, Unlatching, LED		

NOTE: 1) Clean both sides with alcohol wipes
2) Relays mounted opposite to component side
3) Mount all components off board
Use large cable tie for diode spacing
Use 2 small cable ties side by side for relay spacing
4) Mount all components except relays, then clean PCB
5) MLSS100-4 connector (L Faces Out)

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: GPIB Switch Assembly Date Printed 01-Oct-93

Revision 2 Number: 20002 Date Created 29-Apr-93

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		PCB	Address	4101001	REV 0
2	2	2	AMP	746613-3	Connector	16Pin Dip to Ribbon Cbl		
3	3	1	Assman	AR16HZW		16Pin Uni-Dip, Wire Wrap		
4	4	1	AMP	435640-5	Switch	16Pin Dip		
5	5	12"	T&B	171-16	Cable	16Pin Flat Ribbon		

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: GPIB Socket Assembly Date Printed 01-Oct-93

Revision 1 Number: 20010 Date Created 05-Sep-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	3M	3549-1000	Connector	24 pin, IDC, D Ribbon		
2	2	1	AMP	746285-6	Connector	26 pin, IDC, Ribbon		
3	3	1	AMP	553636-3	Connector	IEEE-488 Jack Socket Kit		
4	4	A/R	T&B	171-26	Cable	26 Cond, #28 Flat Ribbon		

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: IO Expander Circuit Assy Date Printed 01-Oct-93

Revision 2 Number: 42203 Date Created 27-Sep-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
				NOTE: Modify As Per ECN # 00013				
1	1	1	MIL		PCB	IO Ezpander PCB	4220301 REV 0	
2								
3	2	1	Maxim	MAX8212CPA	IC	Level Comparator		U2
4	3	1	Nec	82C55	IC	Parallel Port		U1
5	4	1	T.I.	74LS151	IC	8 Channel Selector		U3
6	5	4	T.I.	74LS145	IC	BCD Decoder/Driver		U4,6,9,11
7								
8								
9	6	1	Motorola	1N4148	Diode	Signal		D1
10								
11	7	10	Centralab	CZ20C104M	Capacitor	0.1uF, 50V, Ceramic, .2"S		Decoupling,C1,C2
12	8	2	ITT	TAPC10M35	Capacitor	10uF, 35V, Tantalum, .2"S		C1,5
13								
14	9	1	AMP	2-641268-3	Socket	40 Pin, DIP, Low Profile		U1
15								
16	9	2	Philips	MRS25F 100K	Resistor	100K, 1/4W, 1%, 100PPM, MF		R1-2
17								
18	10	1	T&B	609-BX360	Connector	36 pin, PCB Female		J1
19	11	1	AMP	102159-3	Connector	16 pin, PCB Header, R/A		J2 (Optional)
20	12	4	Panduit	MFSS100-10	Connector	10 pin, PCB Header		PL1, PL2, PU1, PU2
21								

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: (+5V, +12V,) Supply
Date Printed 01-Oct-93

Revision 1 Number: 40011
Date Created 17-Apr-91

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	1	MIL		PCB		00101 REV 1	
2								
3	2	2		RS102	Diode	Bridge		DB1,2
4	3	1	Lin Tech	1.5KE16	Diode	Transorb 16V		D1
5	4	1	Lin Tech	1.5KE30	Diode	Transorb 30V		D2
6								
7	5	1	Mallory	LP182M035A1P3	Capacitor	1800uF, 35V, Eletrolytic		C6
8	6	1	Mallory	LP822M016E1P3	Capacitor	8200uF, 16V, Electrolytic		C3
9	7	2	Sprague	1C20Z5U104M050B	Capacitor	0.1uF, 50V, Ceramic		C1,4
10	8	2		TAP10M35	Capacitor	10uF, 35V, Tantalum		C2,5
11								
12	9	1	Nat Semi	7805CT	Regulator	Positive 5 Volt		U1
13	10	1	Nat Semi	7812CT	Regulator	Positive 12 Volt		U2
14								
15	11	1	AAVID	590102B03600	Heat Sink			U1
16	12	1	AAVID	593002B03400	Heat Sink			U2
17								
18	13	2	Panduit	MLSS100-4	Connector	4 Pin, PCB Header		J2,5
19	14	2	Panduit	MLSS100-4	Connector	4 Pin, PCB Header		J1,4
20								
21	15	4	Keystone	8425	Spacer	Threaded Hex Male/Fem		
22								
23	16	A/R			Hardware	4-40, 1/4" Screws $ Nuts		U1,2
24								
25								

NOTE: 1) All heat sinks to face outer edge of PCB

2) Install Jumpers
"A" x 3
"C" x 2
E

3) L 1,2,4,5 Faces out

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Microprocessor Assy — Date Printed 01-Oct-93

Revision 6 — Number: 42205 — Date Created 13-Jun-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
			NOTE: MODIFY AS PER # 00021					
1	1	1	MIL		PCB	Microprocessor PCB	4100301 REV B	
2								
3	2	1	Intel	P80C85AH	IC	Microprocessor		U10
4	3	1	Intel	P8255A(D71055A)	IC	Parallel Port		U8
5	4	1	TI	TMS9914AN	IC	GPIB Controller		U9
6	5	1	Hitachi	HM6264ALP-15	IC	Static Ram, 64K, 8Kx8		U12
7	6	1	Microchip	27C64	IC	EPROM, 64K, 8Kx8, 300ns		U11
8	7	1	TI	SN751608N	IC	GPIB Transceiver		U18
9	8	1	TI	SN75162BN	IC	GPIB Driver		U17
10	9	1	Any	74HCTLS138	IC	Decoder		U5
11	10	1	"	74HCTLS373	IC	Octal Latch		U22
12	11	1	"	74HCTLS640	IC	Octal Latch		U21
13	12	1	"	74HCTLS32	IC	Quad Or		U4
14	13	2	"	74HCTLS04	IC	Hex Inverter		U3,(19)Opt
15	14	4	"	74LS145	IC	4 to 10 Decoder		U1,2,13,14
16	15	1	Maxim	MAX232	IC	RS232 Driver (Optional)		U23
17								
18	16	1	Fox	HC18-6.144	Crystal	6.144MHz		Xtal
19								
20	17	1	Philips	MRS25F 4K75	Resistor	4.75K, 1/4W, 1%, MF		R1
21	18	1	Philips	MRS25F 47K5	Resistor	47.5K, 1/4W, 1%, MF		R2
22	19	1	Bourns	4610X-101-103	Resistor	10K, Network, 9 Res, 10 Pin		RP1
23								
24	20	1	Motorola	1N4148	Diode	Signal		D1
25								
26	21	1	Centralab	CZ30C105M	Capacitor	1uF, 50V, Ceramic, .3"S		C22
27	22	20	Centralab	CZ20C104M	Capacitor	0.1uF, 50V, Ceramic, .2"S		Decoupling
28	23	5	ITT	TAG 10/35	Capacitor	10uF, 35V, Tantalum, .2"S		C23,(24-27
29								
30	24	1	AMP	102159-3	Connector	16 pin, PCB Header, R/A		Keyboard
31	25	1	AMP	102159-6	Connector	26 pin, PCB Header, R/A		GPIB
32	26	4	Panduit	MFSS100-10	Connector	10 pin, PCB Header		J-L1,L2, J
33	27	1	Panduit	MLAS100-4	Connector	4 pin, PCB Header, R/A		Power
34	28	1	Panduit	MFSS100-5	Connector	5 pin, PCB Header		(Popt)Opti
35	29	3	AMP	2-641268-3	Socket	40 pin, DIP, Low Profile		U8-10
36	30	2	AMP	2-641267-3	Socket	28 pin, DIP, Low Profile		U11,12
37	31	1	AMP	2-641262-3	Socket	16 pin, DIP, Low Profile		U20
38								
39	32	1	T&B	609-BX366	Connector	36 Pin, PCB Header		Interconne

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

Name: Micro-Kbd Cable Assy
Number: 41004

Revision 1

Date Printed 01-Oct-93
Date Created 09-Feb-89

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1								
2	2	2	AMP	746285-3	Connector	16 pin, Socket, Flat Ribbon IDC		
3	3	A/R	ALPHA	3580/16	Cable	16 cond, Flat Ribbon		

MEASUREMENTS INTERNATIONAL LTD. - PARTS LIST - Prescott, Ontario

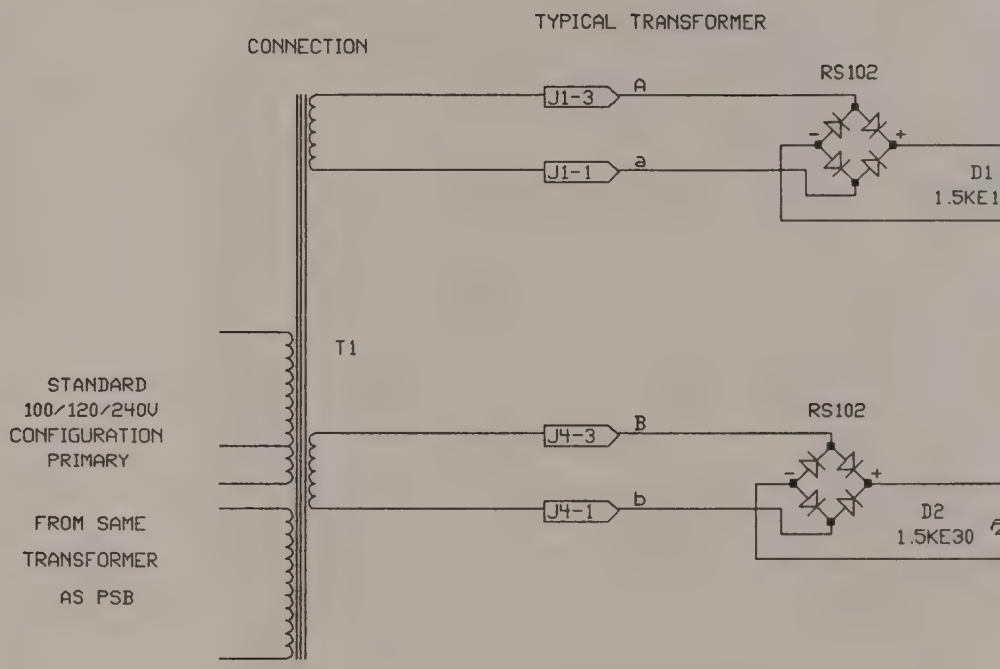
Name: Power Harness
Revision 3 Number: 42204

Date Printed 01-Oct-93
Date Created 20-Oct-90

Line	Item	Qty	Manuf.	Mfg Part#	Name	Description	MIL Part#	Reference
1	1	9	Panduit	TC100F-4	Cover	4 pin, for CT100F22-4		
2	2	9	Panduit	CT100F22-4	Connector	4 pin, #22, IDC		
3	3	A/R			Wire	#22 Guage Stranded, Black		
4	4	A/R			Wire	#22 Guage Stranded, Red		
5	5	A/R			Wire	#22 Guage Stranded, Org		
6	6	A/R			Wire	#22 Guage Stranded, Green		
6	7	A/R			Wire	#22 Guage Stranded, Blue		

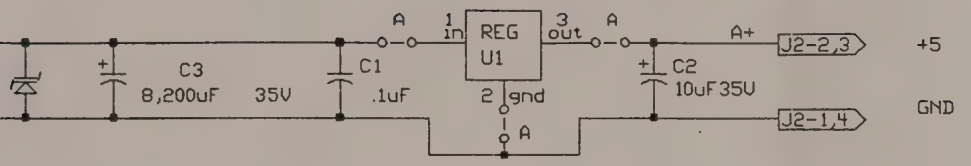
MEASUREMENTS
INTERNATIONAL LTD
5298B
5930B
U1
U2
C1
C2
C3
C4
C5
C6
J3
D1
D2
DB1
DB2
J1
J2
J4
Vout:
A A a a - + + -
B B b b - G G
4220A POWER SUPPLY PC
SEE 40011 SCHEMATIC

J5
J5
00101

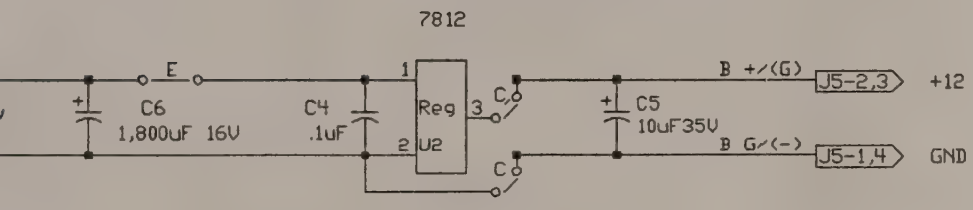

TYPICAL TRANSFORMER
CONNECTION
RS102
J1-3
A
J1-1
a
D1
1.5KE1
T1
STANDARD
100/120/240V
CONFIGURATION
PRIMARY
FROM SAME
TRANSFORMER
AS PSB
RS102
J4-3
B
J4-1
b
D2
1.5KE30

revisions			
ltr	description	date	app'd
A	Prototype Release	21/02/91	
1	Fix Pos Adj Reg Pinout	09/08/91	

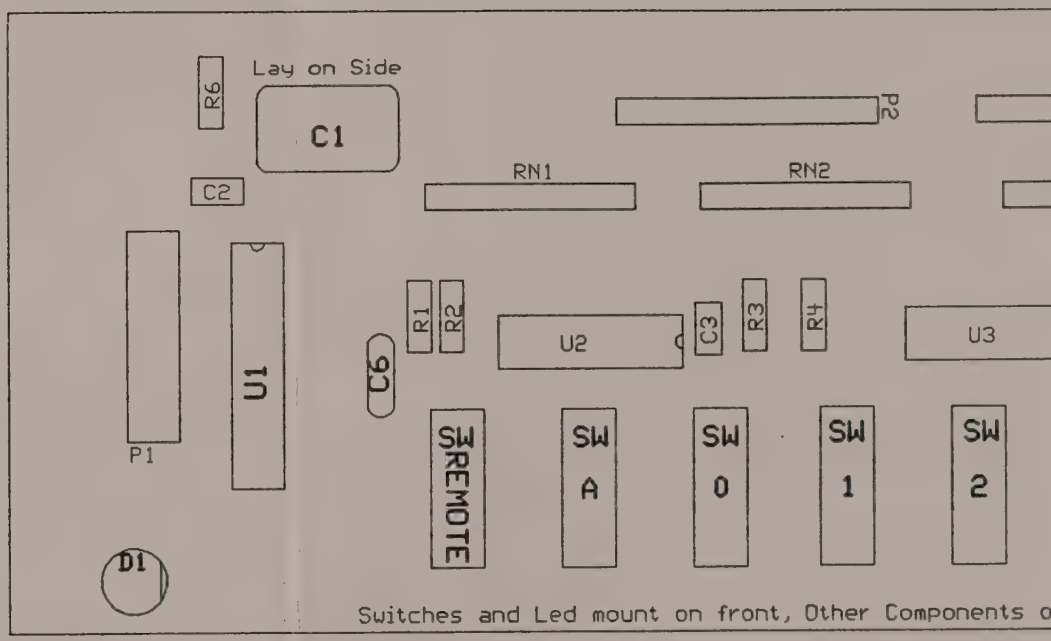
CIRCUIT A



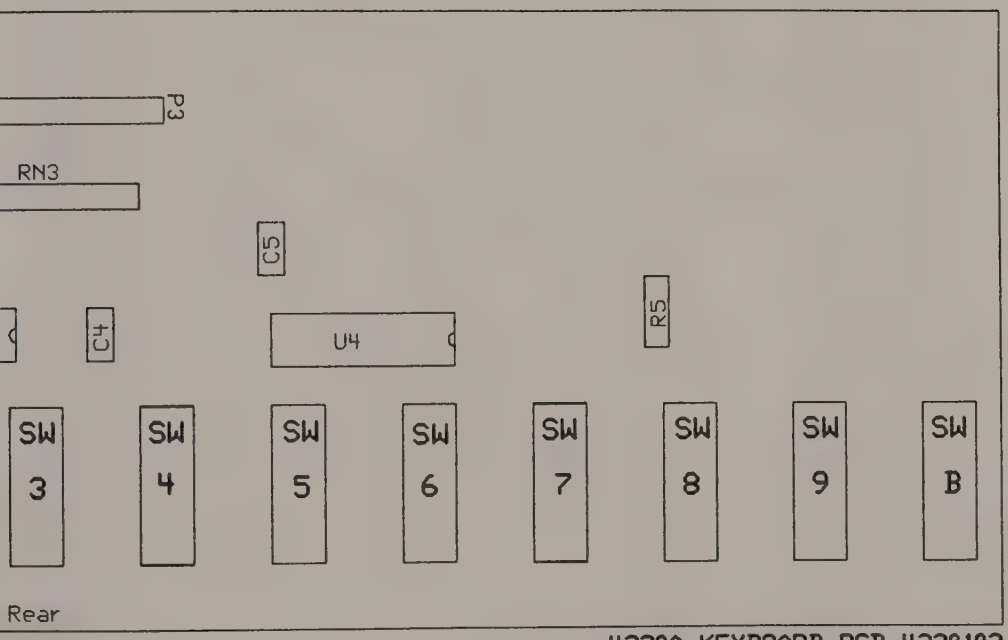
CIRCUIT B



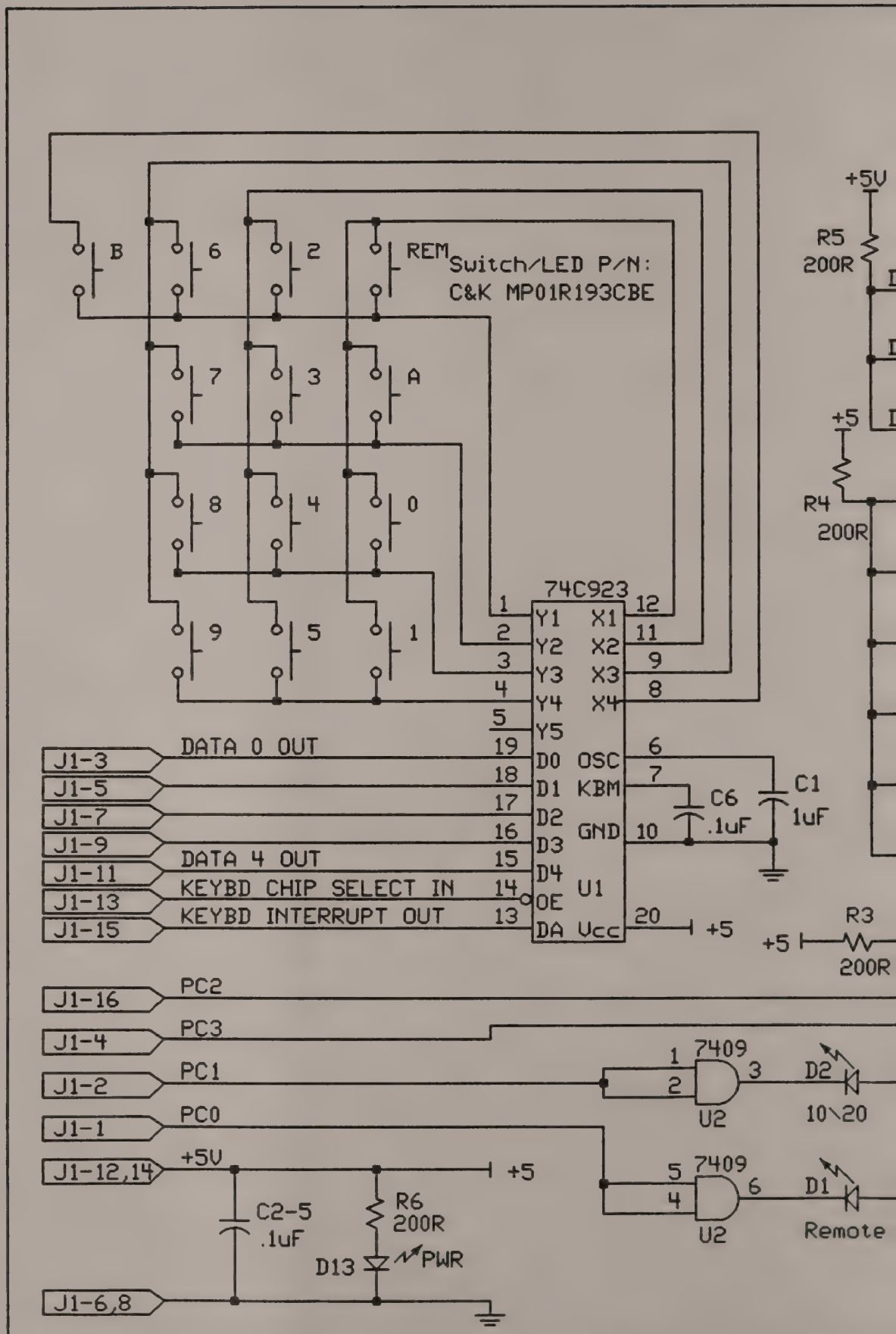
		MEASUREMENTS INTERNATIONAL LTD.	
		4220A POWER Supply Module	
drw.	nu	21/02/91	
appd.			
eng.	nu	Feb. 91	
This drawing is copyright 1991 by Measurements Int Ltd		size C / rev. 1 / drawing no. 40011	
		date 09/08/91	sheet 1 of 1



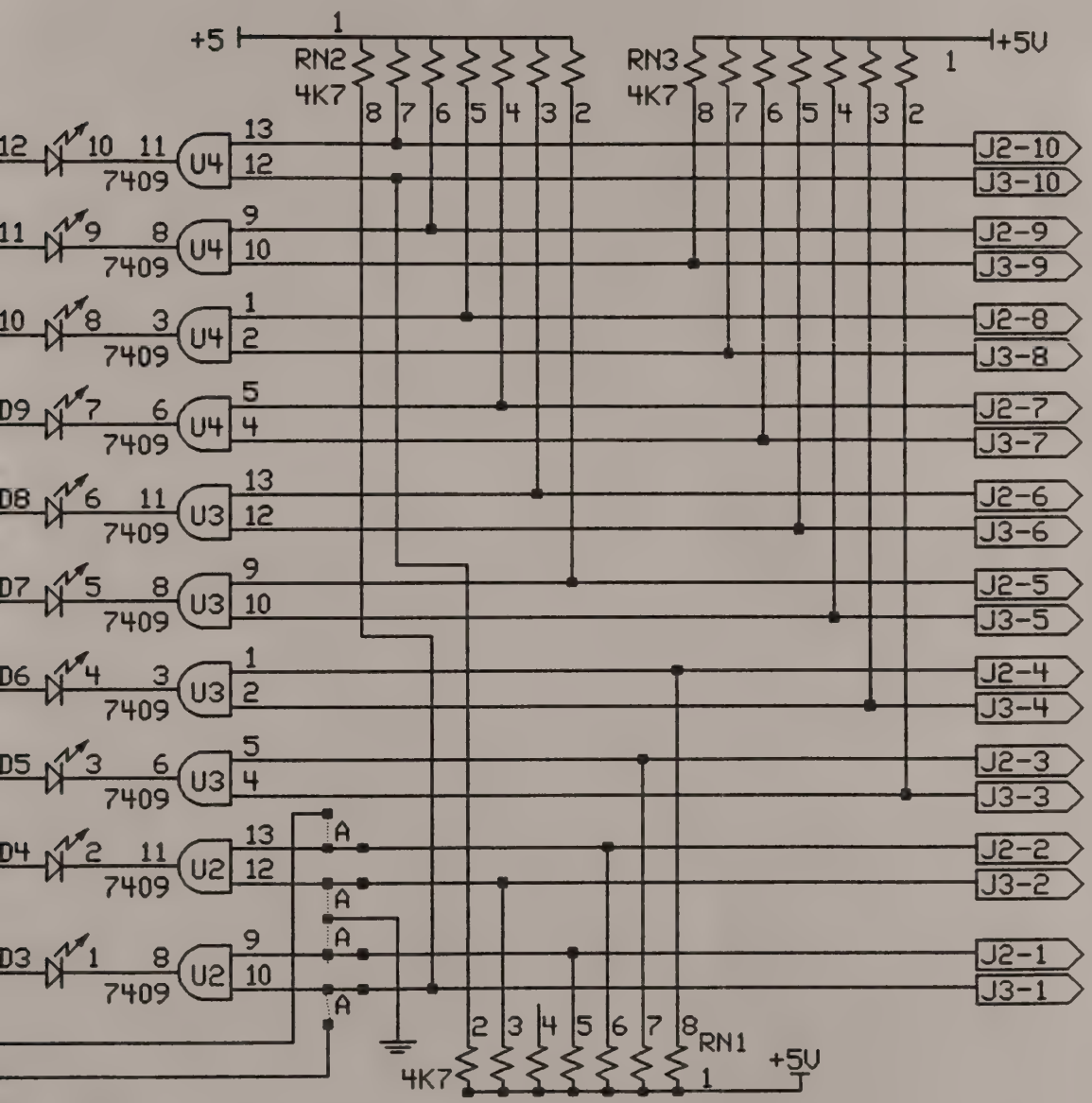
NOTE:
FRONT SIDE OF PCB SHOWN



4220A KEYBOARD PCB 4220102
SEE 41001 SCHEMATIC


B
6
2
REM
Switch/LED P/N:
C&K MP01R193CBE
7
3
A
8
4
0
9
5
1
74C923
Y1
Y2
Y3
Y4
Y5
X1
X2
X3
X4
DATA 0 OUT
DO
D1
D2
D3
DATA 4 OUT
KEYBD CHIP SELECT IN
KEYBD INTERRUPT OUT
OE
DA
OSC
KBM
GND
Vcc
U1
J1-3
J1-5
J1-7
J1-9
J1-11
J1-13
J1-15
C6
.1uF
C1
1uF
+5
+5V
R5
200R
R4
200R
R3
200R
PC2
PC3
PC1
PC0
J1-16
J1-4
J1-2
J1-1
7409
U2
D2
10\20
D1
Remote
J1-12,14
C2-5
.1uF
R6
200R
D13
PWR
J1-6,8

revisions			
ltr	description	date	app'd
A	Prototype Release		
B	4 Switches Added	14/2/90	
2	Power LED Added, 7409	28/10/90	



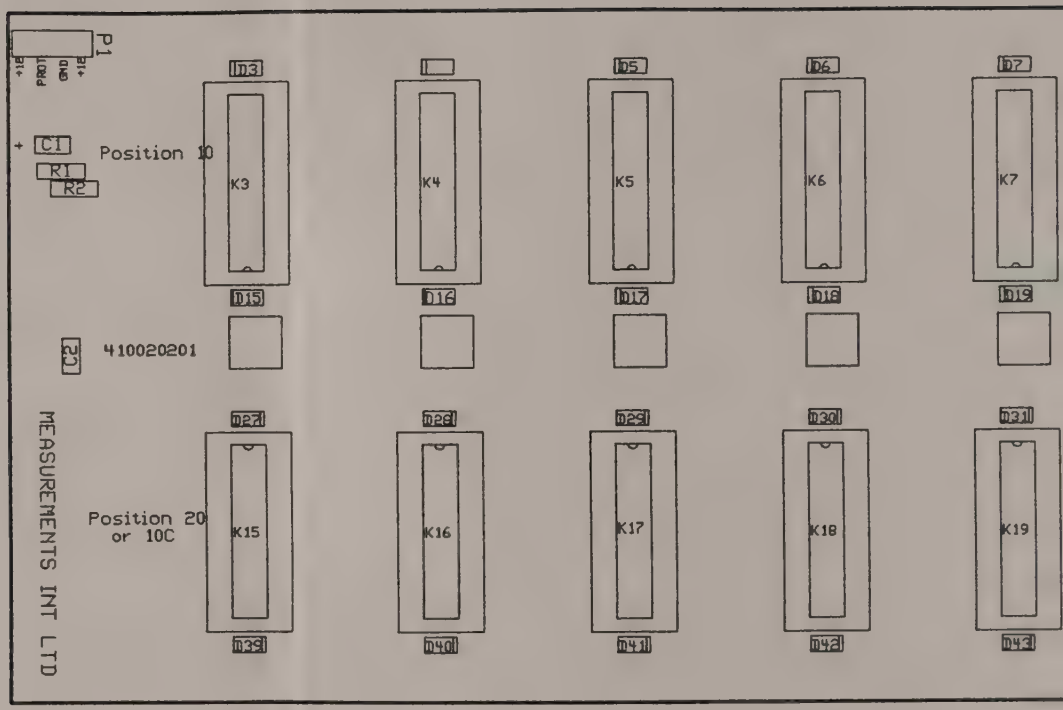
MEASUREMENTS INTERNATIONAL LTD.

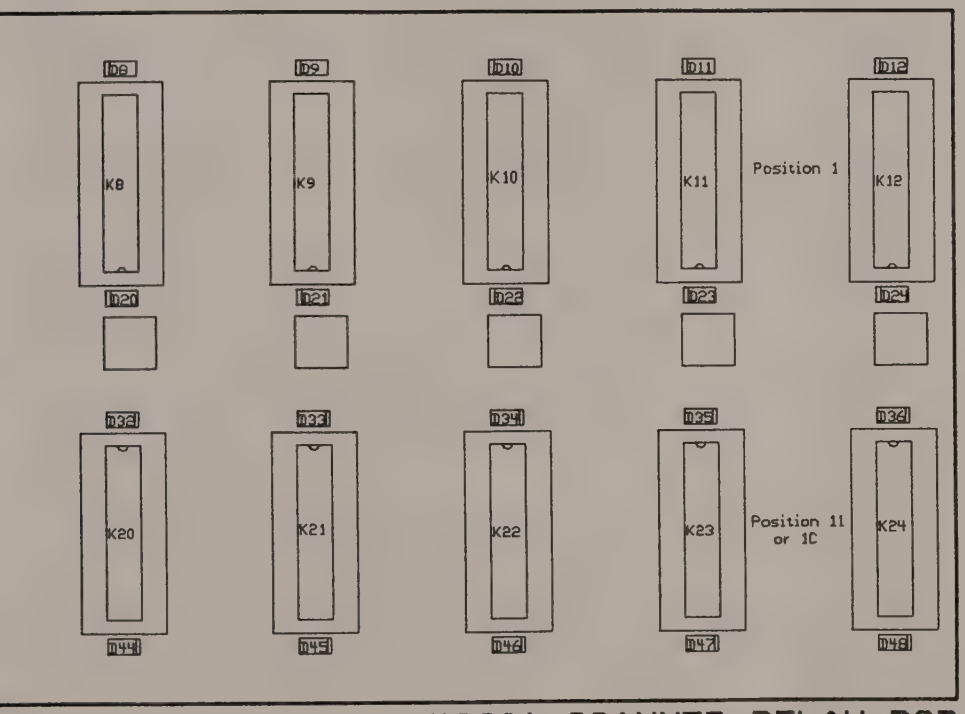
4220A Keyboard Circuit

drw.	nw	11/02/89
appd.		
eng.	db	Jan. 89

size	rev.	drawing no.
B	2	41001

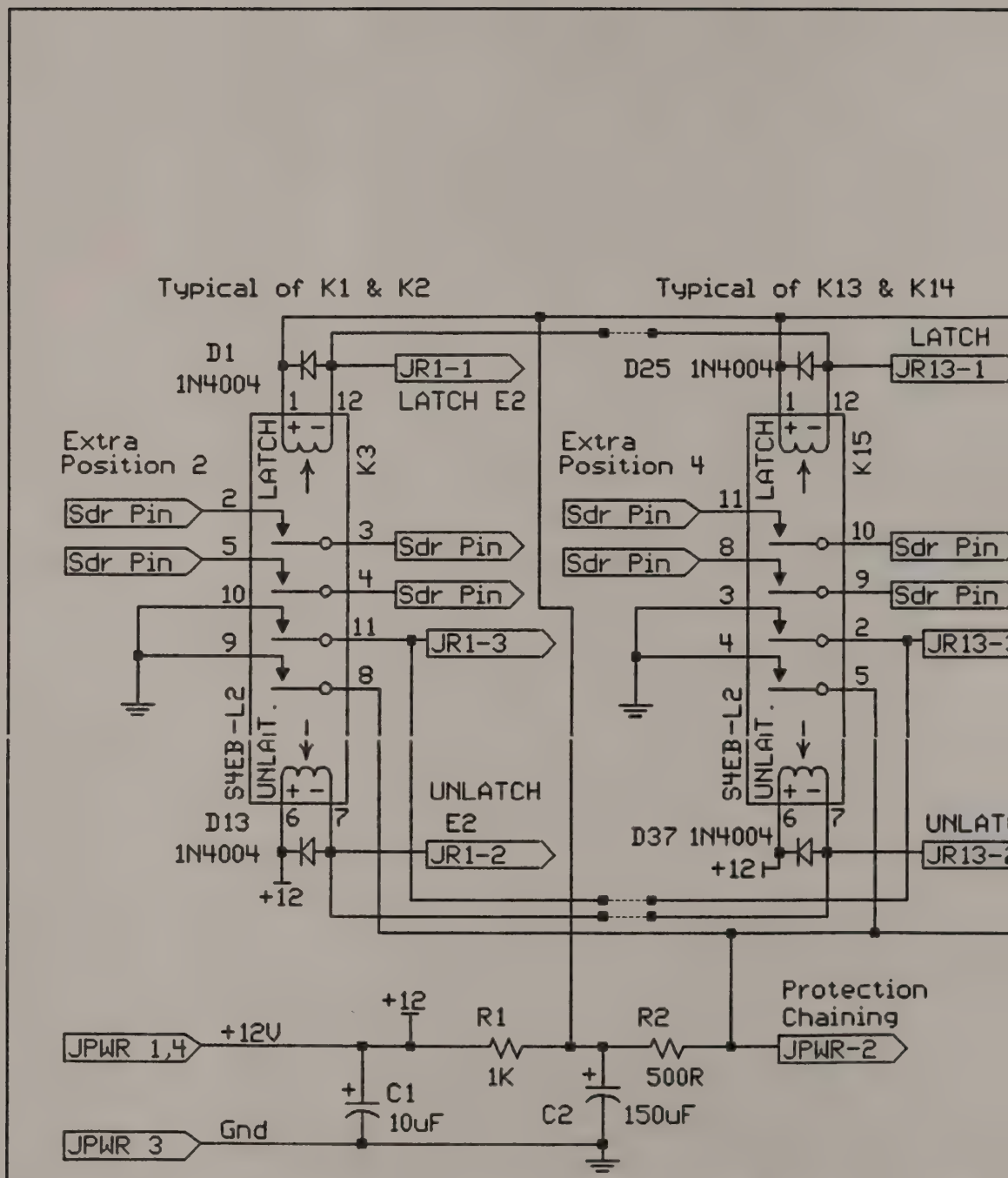
date 28/10/90 | sheet 1 of 1


P1
Bit+
LOAD
GND
Bit+
C1
R1
R2
Position 10
K3
K4
K5
K6
K7
C2
410020201
Position 20
or 10C
K15
K16
K17
K18
K19
MEASUREMENTS INT LTD



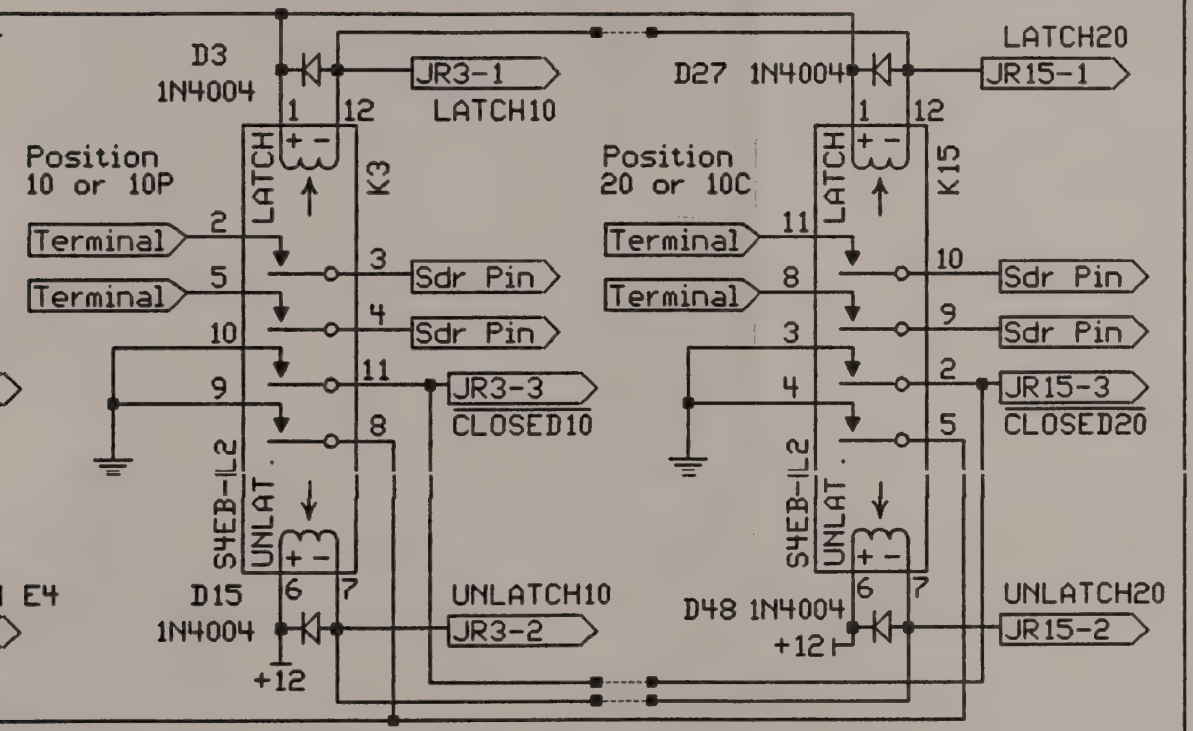
4220A SCANNER RELAY PCB

SEE 41002 SCHEMATIC


Typical of K1 & K2
Typical of K13 & K14
D1
1N4004
JR1-1
LATCH E2
D25 1N4004
LATCH
JR13-1
Extra
Position 2
LATCH
K3
Extra
Position 4
LATCH
K15
Sdr Pin
Sdr Pin
Sdr Pin
Sdr Pin
Sdr Pin
Sdr Pin
Sdr Pin
Sdr Pin
JR1-3
JR13-
S4EB-L2
UNLATCH
UNLATCH
E2
D13
1N4004
JR1-2
D37 1N4004
+12
+12
+12
R1
1K
R2
500R
Protection
Chaining
JPWR-2
JPWR 1,4
+12V
C1
10uF
C2
150uF
JPWR 3
Gnd
FOR MULTIPLE CLOSURE PROTECTION, INSTALL R1 AND
OTHERWISE, REPLACE R1 WITH JUMPER (short) AND OMI

revisions			
ltr	description	date	app'd
C	Bolt mt, double ht	20/08/90	

Only 4 of 24 relays shown



drw.	nw	20/08/90
appd.		
eng.	nw	Aug. 90

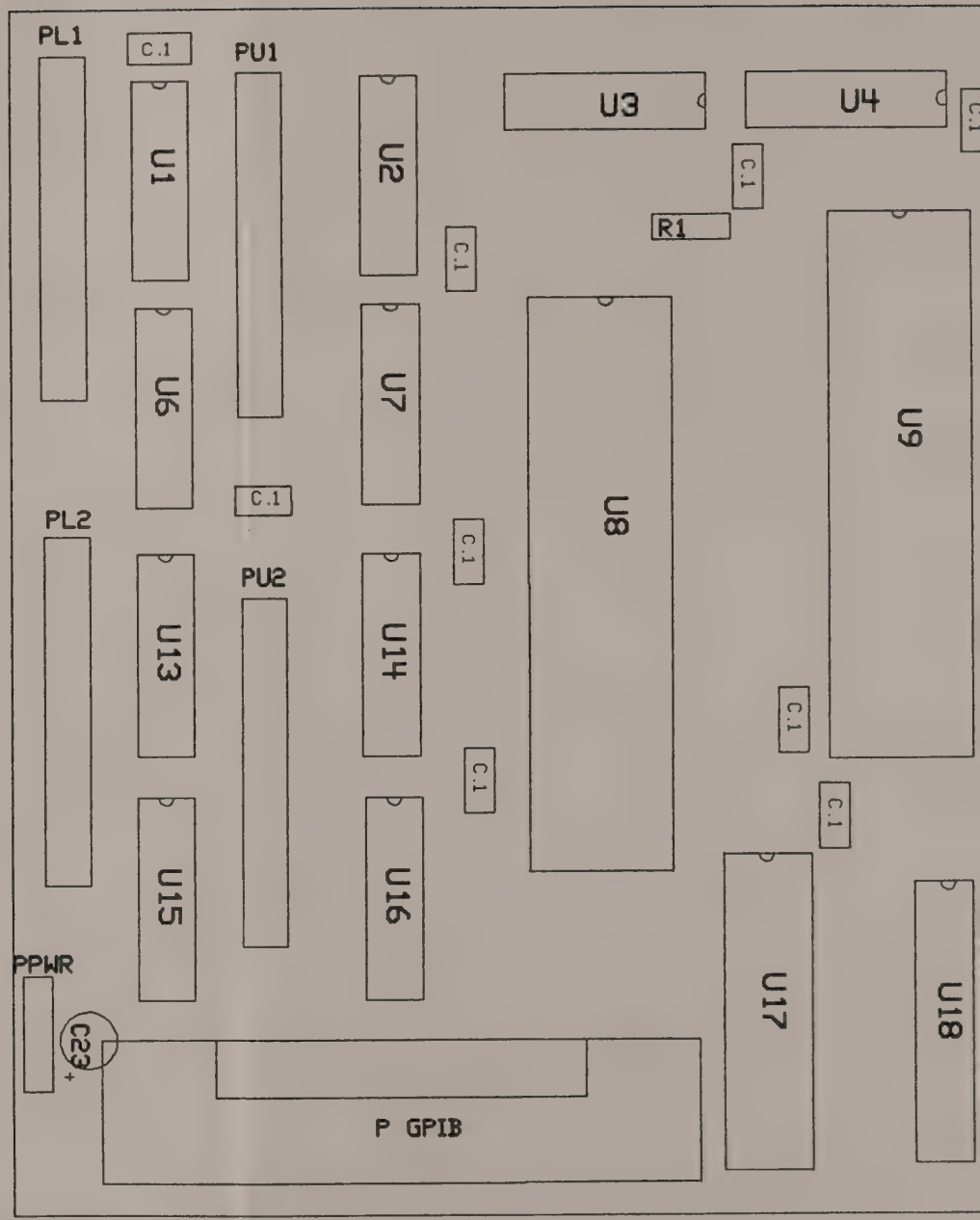
Note:
New Drawing as of revision C

MEASUREMENTS INTERNATIONAL LTD.

4220A
Scanner Relay Cct

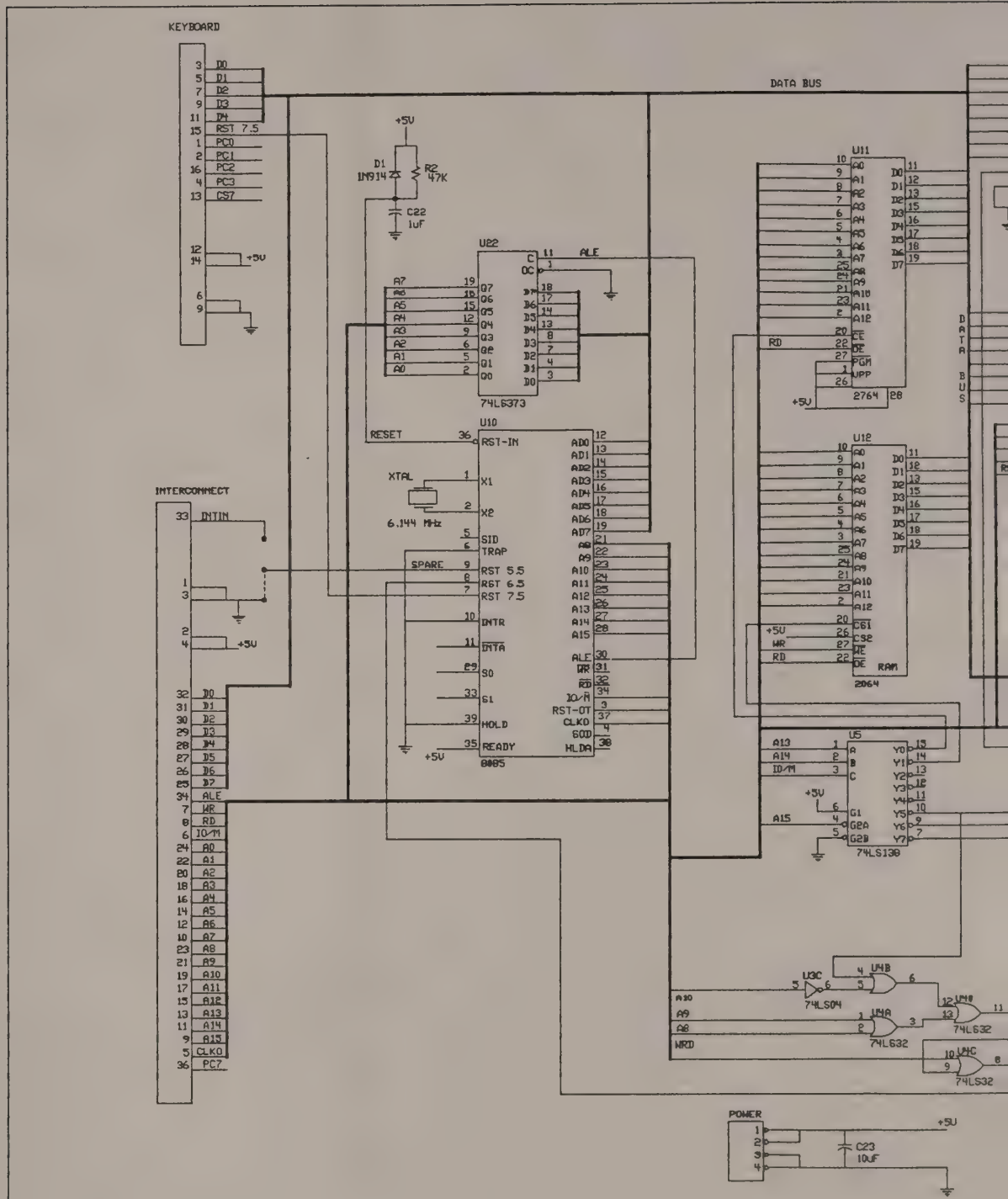
size	rev.	drawing no.
A	C	41002

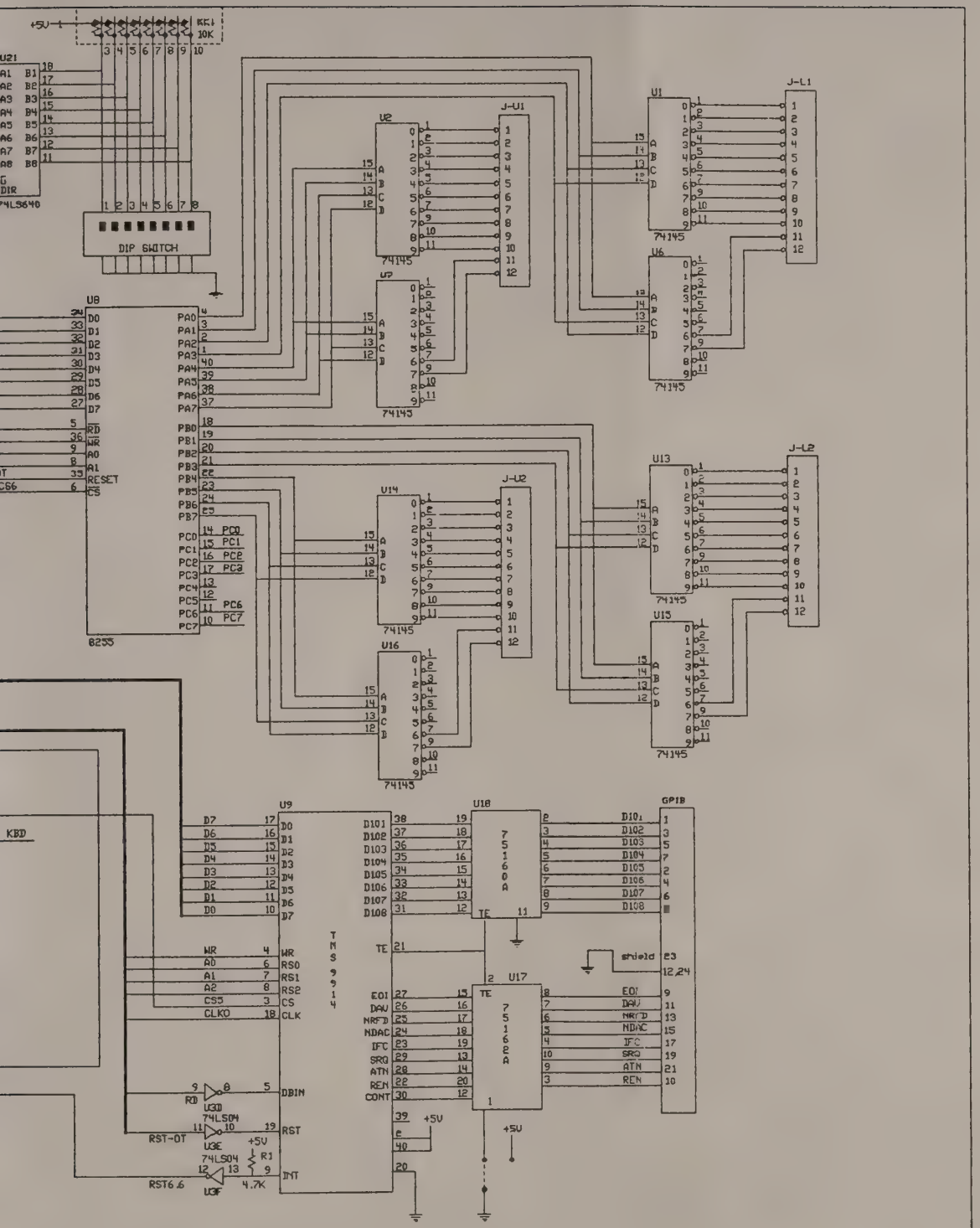
date 02/09/90 | sheet 1 of 1



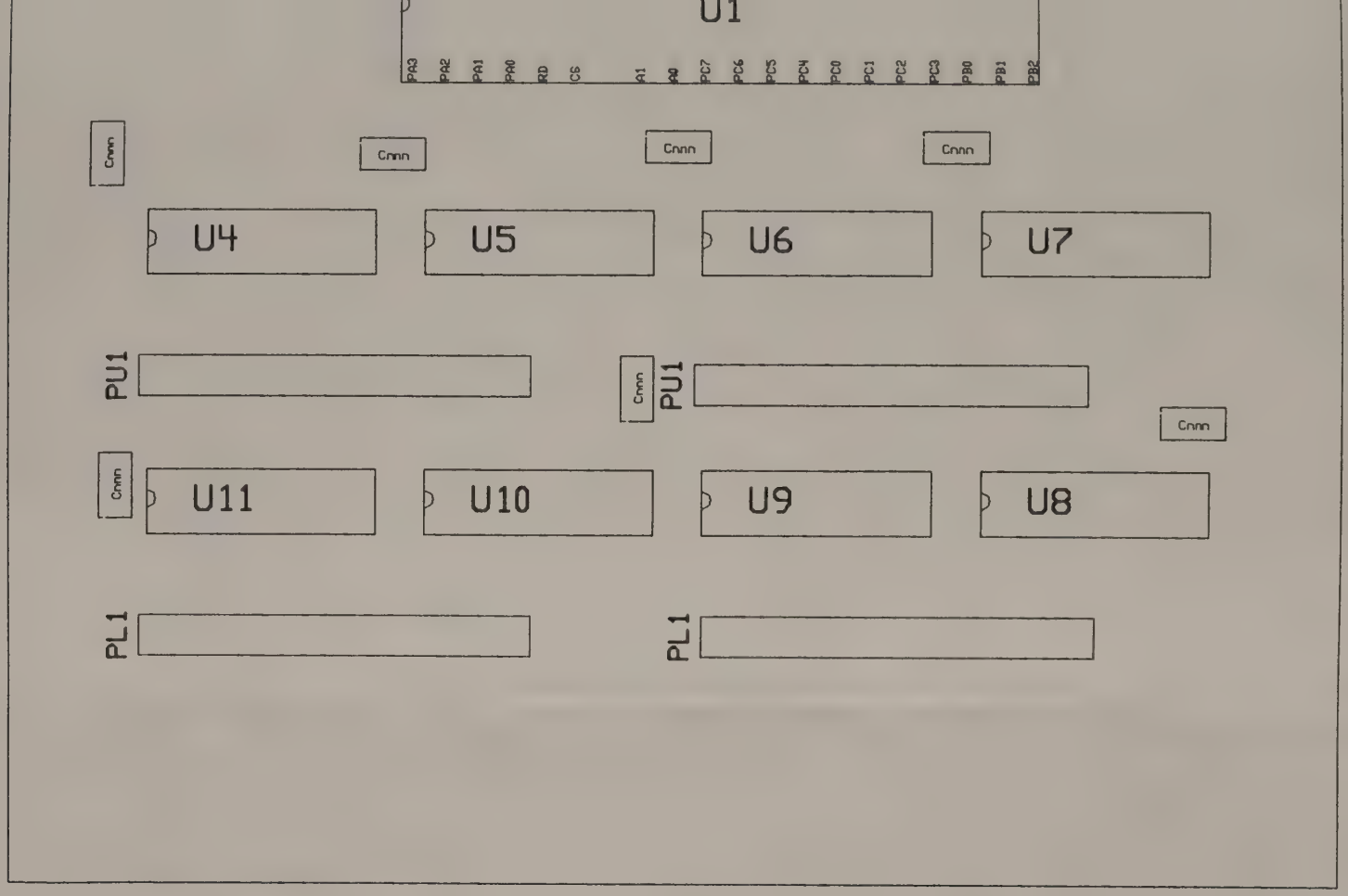
NOTES:
CAPS MARKED C1T ARE 10uF
CAPS MARKED C.1 ARE .1uF
BOTH ARE POWER LINE FILTERS

MICROPROCESSOR PCB 4100301
SEE 41003 SCHEMATIC


KEYBOARD
INTERCONNECT
DATA BUS
U10
8085
RESET
RST-IN
XTAL
6.144 MHz
X1
X2
SID
TRAP
SPARE
RST 5.5
RST 6.5
RST 7.5
INTR
INTA
S0
S1
HOLD
READY
ALE
WR
RD
IO/M
RST-OT
CLKO
SOD
HLDA
AD0
AD1
AD2
AD3
AD4
AD5
AD6
AD7
A8
A9
A10
A11
A12
A13
A14
A15
U22
74LS373
U11
2764
U12
2064
RAM
U5
74LS138
U3C
74LS04
U4A
U4B
U4C
74LS32
D1
IN914
R2
47K
C22
1uF
C23
10uF
POWER
+5V

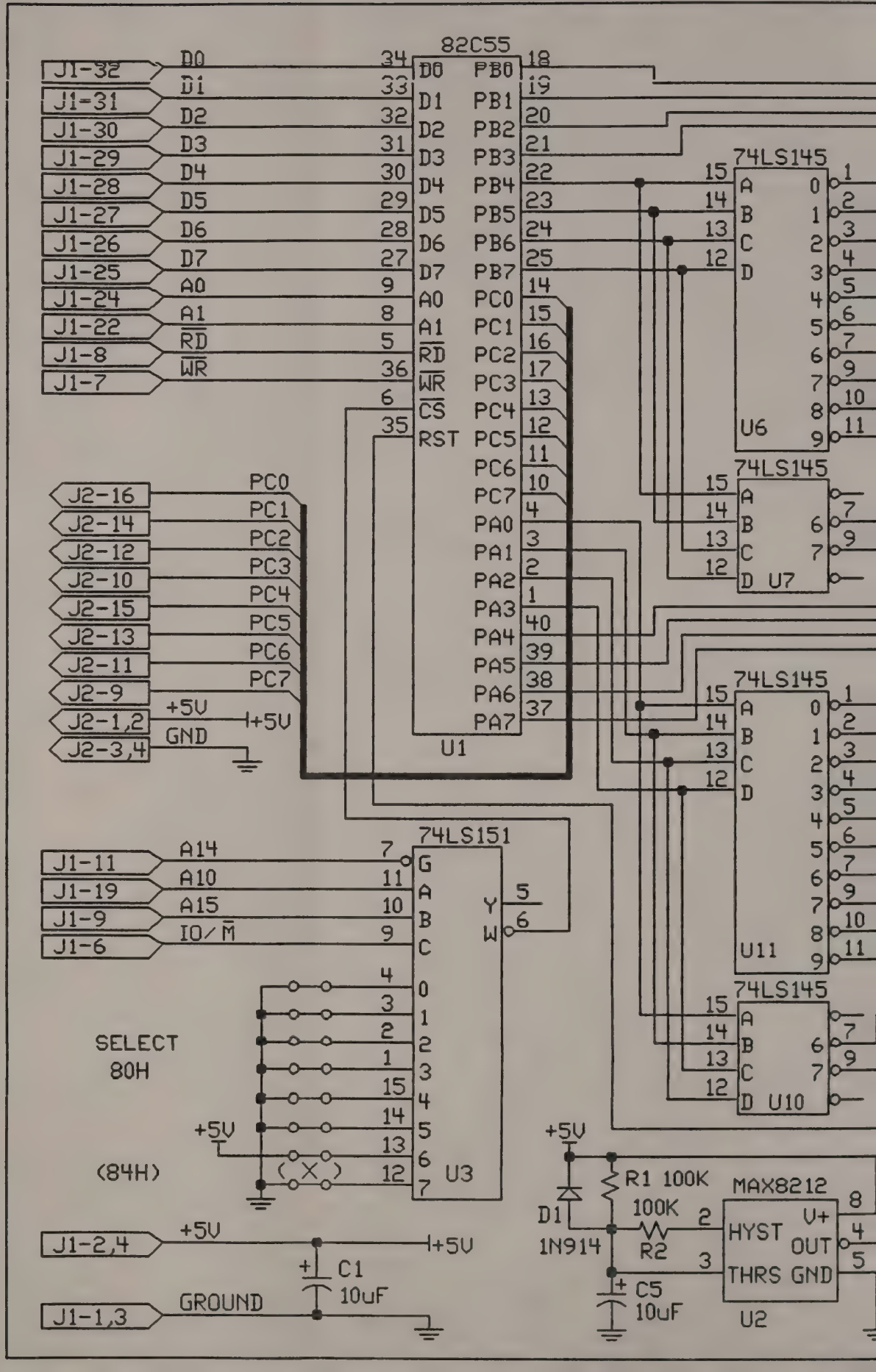


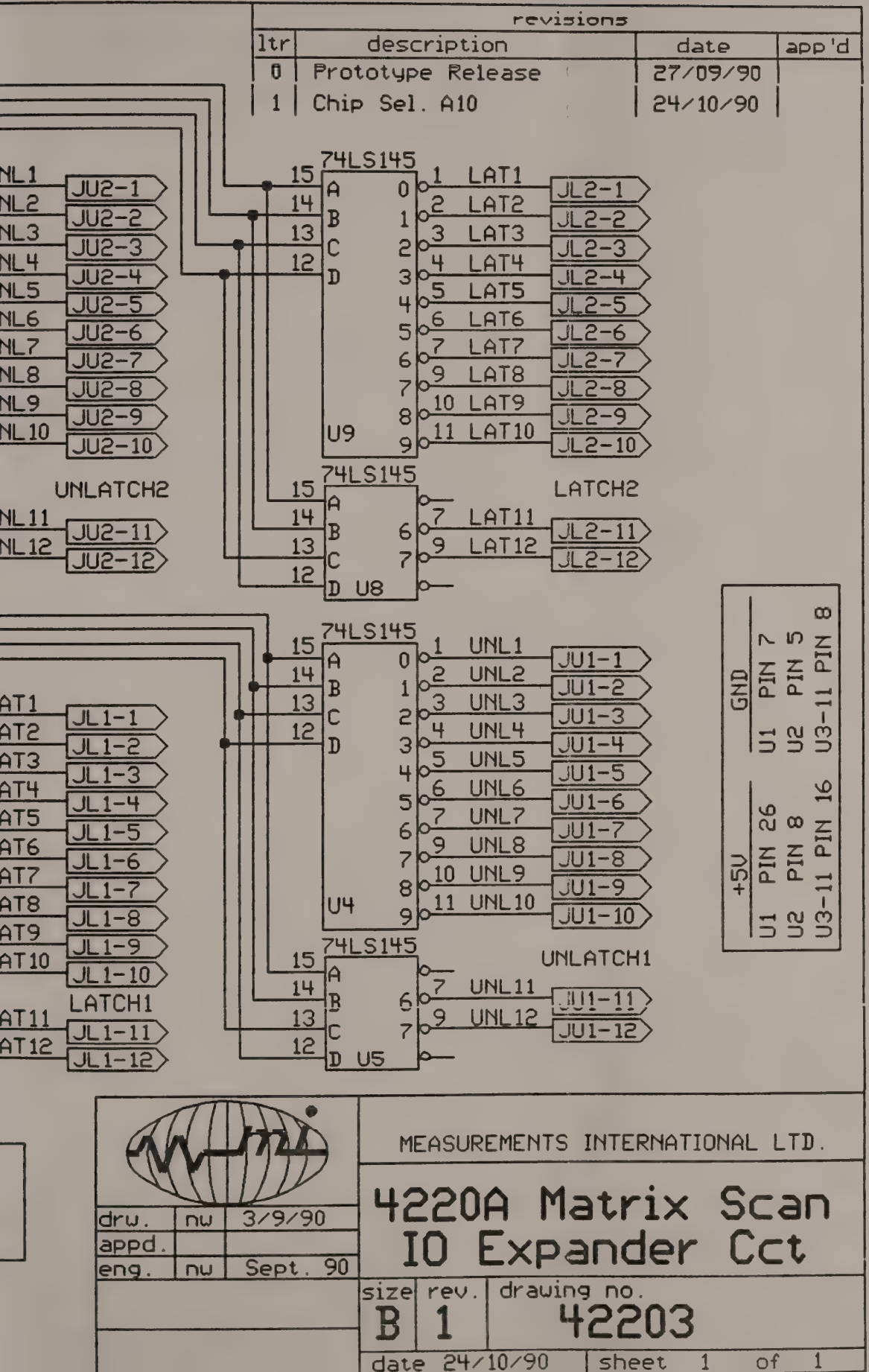
		MEASUREMENTS INTERNATIONAL LTD.	
dru	db 02/03/89	Micro.Sch	
drpd			
eng	db	size C	rev. B
This drawing is copyright 1991 by Measurements Int Ltd		drawing no. 41003	
		date 21/04/93	sheet 1 of 1

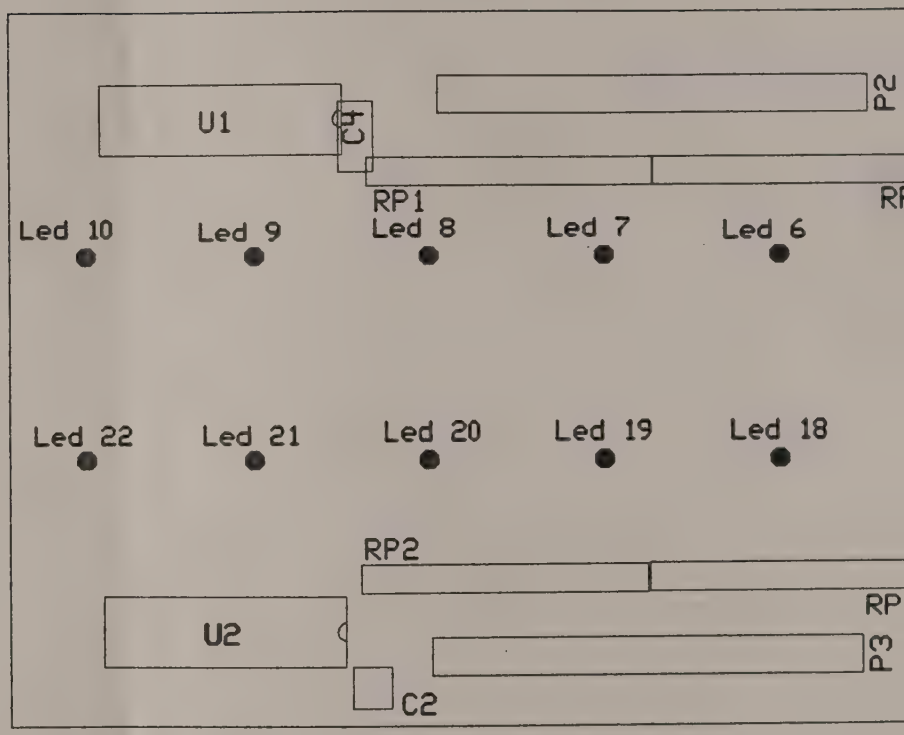

U1
PA3
PA2
PA1
PA0
RD
CS
A1
A0
PC7
PC6
PC5
PC4
PC0
PC1
PC2
PC3
PB0
PB1
PB2
Conn
Conn
Conn
Conn
U4
U5
U6
U7
PU1
PU1
Conn
Conn
Conn
U11
U10
U9
U8
PL1
PL1

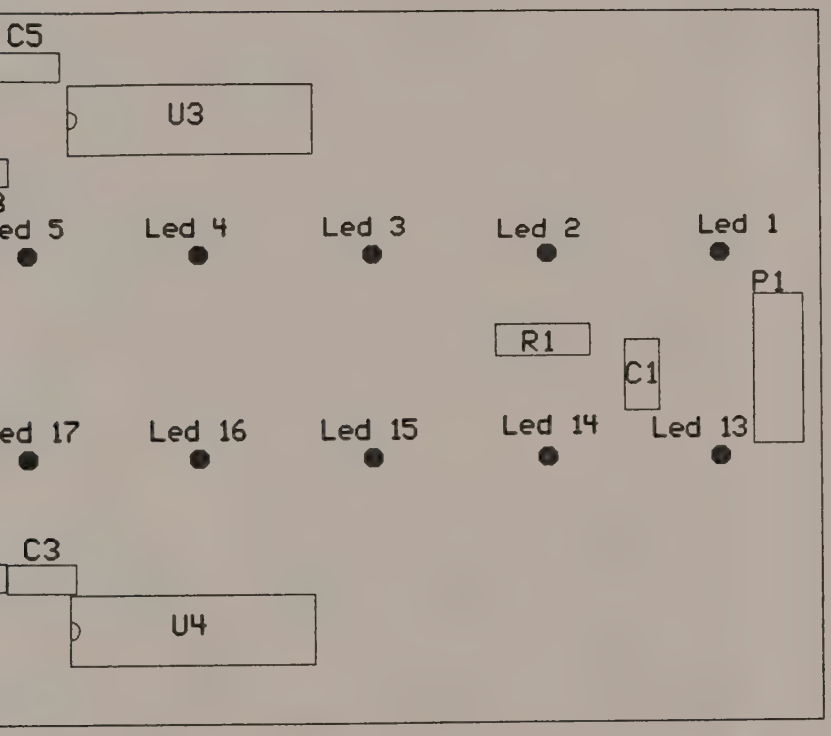
220A MATRIX SCAN IO EXPANDER PCB 4220301

EE 42203 SCHEMATIC

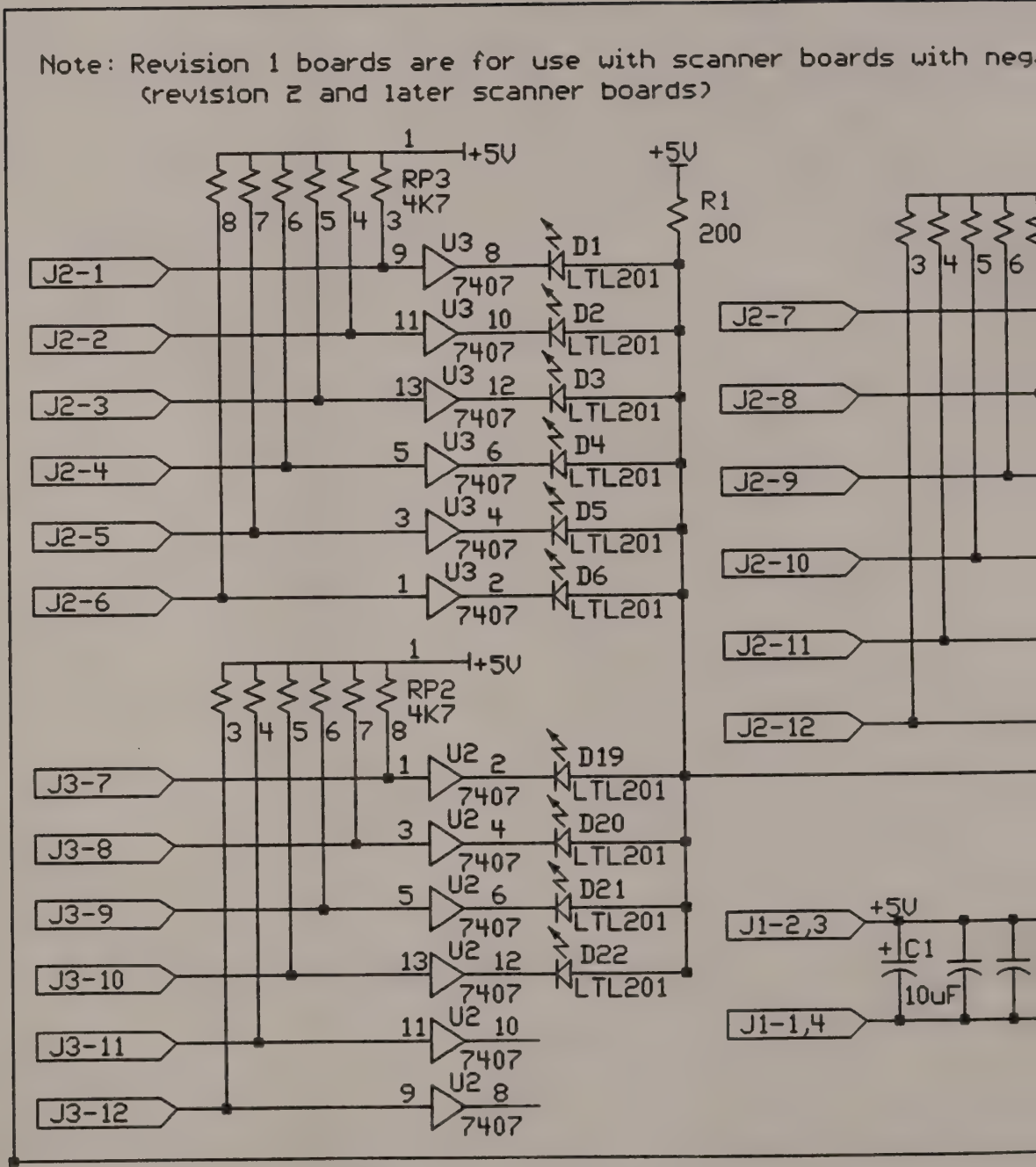

82C55
U1
J1-32
J1-31
J1-30
J1-29
J1-28
J1-27
J1-26
J1-25
J1-24
J1-22
J1-8
J1-7
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
RD
WR
CS
RST
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
74LS145
U6
U7
U10
U11
J2-16
J2-14
J2-12
J2-10
J2-15
J2-13
J2-11
J2-9
J2-1,2
J2-3,4
+5V
GND
74LS151
U3
J1-11
J1-19
J1-9
J1-6
A14
A10
A15
IO/M
SELECT
80H
(84H)
J1-2,4
J1-1,3
GROUND
C1
10uF
D1
1N914
R1 100K
100K
R2
C5
10uF
MAX8212
U2
HYST
THRS
V+
OUT
GND


revisions
ltr | description | date | app'd
0 | Prototype Release | 27/09/90 |
1 | Chip Sel. A10 | 24/10/90 |
74LS145
U9
74LS145
U8
74LS145
U4
74LS145
U5
UNLATCH2
LATCH2
UNLATCH1
LATCH1
JU2-1
JU2-2
JU2-3
JU2-4
JU2-5
JU2-6
JU2-7
JU2-8
JU2-9
JU2-10
JU2-11
JU2-12
JL2-1
JL2-2
JL2-3
JL2-4
JL2-5
JL2-6
JL2-7
JL2-8
JL2-9
JL2-10
JL2-11
JL2-12
JL1-1
JL1-2
JL1-3
JL1-4
JL1-5
JL1-6
JL1-7
JL1-8
JL1-9
JL1-10
JL1-11
JL1-12
JU1-1
JU1-2
JU1-3
JU1-4
JU1-5
JU1-6
JU1-7
JU1-8
JU1-9
JU1-10
JU1-11
JU1-12
+5V
U1 PIN 26
U2 PIN 8
U3-11 PIN 16
GND
U1 PIN 7
U2 PIN 5
U3-11 PIN 8
MEASUREMENTS INTERNATIONAL LTD.
4220A Matrix Scan IO Expander Cct
drw. nw 3/9/90
appd.
eng. nw Sept. 90
size B
rev. 1
drawing no. 42203
date 24/10/90
sheet 1 of 1


U1
C4
P2
RP1
Led 10
Led 9
Led 8
Led 7
Led 6
Led 22
Led 21
Led 20
Led 19
Led 18
RP2
U2
P3
C2

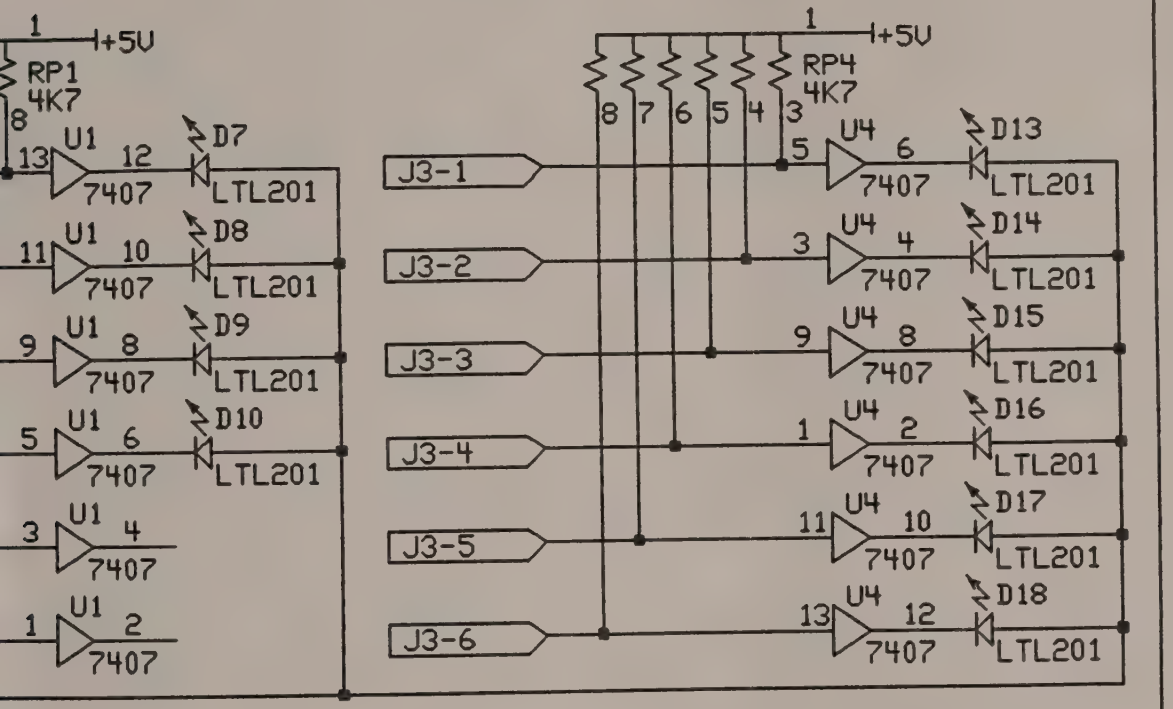


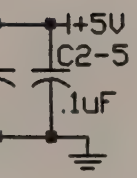
4220A CHANNEL INDICATOR PCB 8000104
SEE 80001 SCHEMATIC


Note: Revision 1 boards are for use with scanner boards with neg
(revision 2 and later scanner boards)
1
+5V
RP3
4K7
8 7 6 5 4 3
+5V
R1
200
J2-1
J2-2
J2-3
J2-4
J2-5
J2-6
9
11
13
5
3
1
U3 8
U3 10
U3 12
U3 6
U3 4
U3 2
7407
D1
D2
D3
D4
D5
D6
LTL201
3 4 5 6
J2-7
J2-8
J2-9
J2-10
J2-11
J2-12
1
+5V
RP2
4K7
3 4 5 6 7 8
J3-7
J3-8
J3-9
J3-10
J3-11
J3-12
1
3
5
13
11
9
U2 2
U2 4
U2 6
U2 12
U2 10
U2 8
7407
D19
D20
D21
D22
LTL201
J1-2,3
J1-1,4
+5V
+
C1
10uF

ive closure logic

revisions			
ltr	description	date	app'd
A	Prototype Release	10/18/89	
1	Reversed Driver Sense	07/09/90	





MEASUREMENTS INTERNATIONAL LTD.

drw.	NW	10/18/89
appd.		
eng.	nw	Oct. 89

4220A

Channel Indicator Board

size	rev.	drawing no.
A	1	80001

date 07/09/90 | sheet 1 of 1

Measurements International

consulting, training, manufacturing in electrical metrology

CERTIFICATE OF PERFORMANCE

Limited Warranty:

All instruments sold by Measurements International are warranted to the original purchaser against defects in materials and workmanship from the date of original shipment from the factory for a period of three years unless otherwise specified under extended warranty.

Model # 4220A **S/N** 951002

During the warranty period Measurements International will, at it's option, either repair or replace products which prove to be defective. Warranty service or repair must be performed at the factory. The purchaser must notify Measurements International prior to returning the instrument.

The buyer shall return the instrument properly packaged and with transportation and insurance prepaid and Measurements International shall repair or replace the defective instrument without charge and at its expense pay transportation and insurance back to the original purchaser.

This warranty does not apply to any instruments determined by Measurements International to have been subjected to customer alteration, modification, negligence or misuse.

EXCEPT AS SET FORTH ABOVE, MEASUREMENTS INTERNATIONAL WILL NOT BE RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Date: 30/11/95 Authorized Signature: Ian Kirkwood

P.O. Box 2359, Prescott, Ontario, Canada K0E 1T0 • Tel.: (613) 925-5934 • Fax: (613) 925-1195

Measurements International

consulting, training, manufacturing in electrical metrology

Ref: Inv#951203-S
Model 4220A

CERTIFICATE OF COMPLIANCE

I hereby certify that the product furnished by Measurements International is manufactured in accordance with the specifications detailed in our product bulletin unless otherwise agreed upon through our mutual collaboration as defined in a specific contract between ourselves and the contract client.

Signed: D. Kirkwood Jr

Duane Brown, President

Dated: November 30, 1995

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Measurements International

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P.O. Box 2359 Prescott, Ontario K0E 1T0
Telephone: (613) 925-5934 Fax (613) 925-1195

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